Of course! Here is a list of 20 programming problems designed to help your students practice and strengthen their understanding of fundamental JavaScript concepts. The problems are scenario-based, progressively cover the topics you mentioned, and include sample inputs and outputs.

Part 1: Data Types, Variables & Conditionals

Problem 1: The Cafe Order

Scenario: A customer is ordering from a cafe. You need to calculate the total cost of their order.

Topics: Variables, Data Types (Number, String), Arithmetic Operators

Problem: Declare variables for the price of a coffee, a pastry, and the number of coffees and pastries ordered. Calculate and display the total cost.

- **Sample Input (as variable values):**
    - coffeePrice = 5
    - pastryPrice = 3.5
    - coffeeQuantity = 2
    - pastryQuantity = 1
- **Sample Output (in console):**
- The total cost of your order is $13.5.

Problem 2: User Profile Card

Scenario: You are creating a simple profile system. You need to store user information and display it in a summary.

Topics: Variables, Data Types (String, Number, Boolean), String Concatenation/Template Literals

Problem: Create variables to store a user's name, age, and whether they are a student (boolean). Combine these variables into a single string that introduces the user.

- **Sample Input (as variable values):**
    - name = "Alice"
    - age = 21
    - isStudent = true

- **Sample Output (in console):**
- Name: Alice, Age: 21, Student: Yes

Problem 3: Movie Night Age Check

Scenario: A movie theater has age restrictions for a film. You need to check if a person is old enough to watch.

Topics: Conditional (if/else)

Problem: Write a program that checks if a person's age is 18 or over. Display one message if they are allowed to watch and another if they are not.

- **Sample Input 1:**
    - userAge = 25
- **Sample Output 1:**
- Welcome! You are old enough to watch this movie.
- **Sample Input 2:**
    - userAge = 16
- **Sample Output 2:**
- Sorry, you are not old enough to watch this movie.

Problem 4: Grade Assigner

Scenario: A teacher needs to assign a letter grade based on a student's score.

Topics: Conditional (if/else if/else)

Problem: Write a program that takes a numerical score and prints the corresponding letter grade based on the following scale:

- 90-100: 'A'
- 80-89: 'B'
- 70-79: 'C'
- 60-69: 'D'
- Below 60: 'F'
- **Sample Input:**

    - score = 85
- **Sample Output:**
- The grade is B.

Part 2: Looping & Nested Loops

Problem 5: The Daily Steps Counter

Scenario: An fitness app needs to sum up the steps taken over a week.

Topics: Array, Looping (for)

Problem: You are given an array of steps taken each day for a week. Use a for loop to calculate the total number of steps.

- **Sample Input:**
    - dailySteps = [5021, 7503, 4987, 10050, 8010, 6500, 7899]
- **Sample Output:**
- Total steps for the week: 49970

Problem 6: Countdown to New Year

Scenario: You are building a program to display a countdown for a rocket launch or New Year's Eve.

Topics: Looping (for)

Problem: Write a program that uses a for loop to count down from 10 to 1, and then prints "Blast Off!".

- **Sample Input:** (None)
- **Sample Output:**
- 10
- 9
- 8
- 7
- 6

- 5
- 4
- 3
- 2
- 1
- Blast Off!

Problem 7: Guest List Greeter

Scenario: You are an event organizer and want to print a personalized welcome message for each guest on a list.

Topics: Array, Looping (for...of)

Problem: Given an array of guest names, use a for...of loop to iterate through the array and print a welcome message for each guest.

- **Sample Input:**
    - guestList = ["Bob", "Charlie", "Denise"]
- **Sample Output:**
- Welcome to the party, Bob!
- Welcome to the party, Charlie!
- Welcome to the party, Denise!

Problem 8: Simple Pattern Printing

Scenario: You want to create a simple visual pattern using code, like a small square.

Topics: Nested Loop

Problem: Write a program using nested for loops to print a 5x5 square of asterisks (*).

- **Sample Input:** (None)
- **Sample Output:**
- *****
- *****
- *****

- *****
- *****

Part 3: Functions & Array/String Manipulation

Problem 9: The Rectangle Area Calculator

Scenario: An application needs a reusable tool to calculate the area of a rectangle.

Topics: Function, Parameters, Return

Problem: Create a function named calculateArea that takes two arguments, width and height. The function should return the area of the rectangle (Area=widthtimesheight).

- **Sample Input (calling the function):**
    - calculateArea(10, 8)
- **Sample Output (from the return value):**
- 80

Problem 10: The Word Reverser

Scenario: You're making a fun text utility that reverses any given word.

Topics: Function, String Manipulation (.split, .reverse, .join)

Problem: Write a function reverseWord that takes a single string (a word) as an argument and returns the word spelled backward.

- **Sample Input:**
    - reverseWord("JavaScript")
- **Sample Output:**
- "tpircSavaJ"

Problem 11: Find the Largest Number

Scenario: You need to find the highest score from a list of test results.

Topics: Function, Array, Looping, Conditional

Problem: Write a function findMaxNumber that takes an array of numbers as an argument and returns the largest number in the array.

- **Sample Input:**
    - findMaxNumber([12, 5, 27, 8, 19])
- **Sample Output:**
- 27

Problem 12: The Vowel Counter

Scenario: A text analysis tool needs to count the number of vowels in a sentence.

Topics: Function, String Manipulation, Looping, Conditional

Problem: Write a function countVowels that takes a string as an argument and returns the number of vowels (a, e, i, o, u) it contains. The function should be case-insensitive.

- **Sample Input:**
    - countVowels("Hello World")
- **Sample Output:**
- 3

Problem 13: Shopping Cart Filter

Scenario: An e-commerce website wants to show a customer all items in their cart that are over a certain price.

Topics: Function, Array (.filter or for loop)

Problem: Write a function filterByPrice that takes an array of item prices and a minimumPrice. It should return a new array containing only the prices that are greater than or equal to the minimumPrice.

- **Sample Input:**
    - prices = [10, 25, 8, 42, 15, 5]
    - minimumPrice = 20
- **Sample Output:**
- [25, 42]

Problem 14: Palindrome Checker

Scenario: You are building a word game and need to check if a word is a palindrome (reads the same forwards and backwards).

Topics: Function, String Manipulation, Conditional

Problem: Write a function isPalindrome that takes a string as input. It should return true if the string is a palindrome and false otherwise. The check should be case-insensitive.

- **Sample Input 1:**
    - isPalindrome("Racecar")
- **Sample Output 1:**
- true
- **Sample Input 2:**
    - isPalindrome("Hello")
- **Sample Output 2:**
- false

Problem 15: Capitalize First Letter

Scenario: You need to format a list of names so that each name has its first letter capitalized.

Topics: Function, Array (.map or loop), String Manipulation

Problem: Write a function capitalizeNames that takes an array of names (all lowercase) and returns a new array with each name's first letter capitalized.

- **Sample Input:**
    - names = ["john", "mary", "peter"]
- **Sample Output:**
- ["John", "Mary", "Peter"]

Part 4: DOM Manipulation

Note: *For these problems, you will need a simple HTML file to work with.*

Sample HTML for Problems 16-20:

HTML

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>JS Practice</title>
    <style>
        body { font-family: sans-serif; padding: 20px; }
        .dark-mode { background-color: #333; color: white; }
        #todo-list { list-style-type: none; padding: 0; }
        #todo-list li { padding: 8px; border-bottom: 1px solid #ddd; }
    </style>
</head>
<body>
    <h1 id="welcome-message">Hello, Guest!</h1>
    <button id="change-text-btn">Change Greeting</button>

    <hr>

    <p>Click the button to toggle dark mode.</p>
    <button id="toggle-mode-btn">Toggle Light/Dark Mode</button>

    <hr>

    <h2>My To-Do List</h2>
    <ul id="todo-list">
        <li>Learn JavaScript</li>
    </ul>
```

```
    <input type="text" id="new-item-input" placeholder="Add a new item">
    <button id="add-item-btn">Add Item</button>

    <script src="your-script-file.js"></script>
</body>
</html>
```

Problem 16: Dynamic Greeting

Scenario: You want to change the welcome message on a webpage when a user clicks a button.

Topics: DOM Manipulation (getElementById), Event Listener (click), .innerText

Problem: Using the sample HTML, write a script that targets the <h1> with the ID welcome-message. When the button with the ID change-text-btn is clicked, change the <h1> text to "Welcome, JavaScript Coder!".

- **Input:** User clicks the "Change Greeting" button.
- **Output (on the webpage):** The <h1> text changes from "Hello, Guest!" to "Welcome, JavaScript Coder!".

Problem 17: The Light Switch

Scenario: You want to create a button that toggles a "dark mode" on your webpage.

Topics: DOM Manipulation (querySelector), Event Listener, .classList.toggle()

Problem: Write a script that targets the <body> element. When the button with the ID toggle-mode-btn is clicked, it should add or remove a CSS class named dark-mode from the body. (The CSS for .dark-mode is in the sample HTML).

- **Input:** User clicks the "Toggle Light/Dark Mode" button.
- **Output (on the webpage):** The background and text colors of the page toggle between the default and the .dark-mode styles.

Problem 18: Add Item to a List

Scenario: You are building a simple to-do list application where a user can add new items to a list.

Topics: DOM (getElementById, createElement, appendChild), Input Value (.value)

Problem: Write a script that takes the text from the input field (new-item-input). When the "Add Item" button (add-item-btn) is clicked, create a new <li> element, set its text to the input's value, and add it to the bottom of the <ul> with the ID todo-list.

- **Input:** User types "Practice DOM" into the input field and clicks the "Add Item" button.
- **Output (on the webpage):** A new list item with the text "Practice DOM" appears in the to-do list.

Problem 19: Character Counter

Scenario: An input field on a form needs to show the user how many characters they have typed.

Topics: DOM, Event Listener (keyup)

Problem: Modify the HTML to add a Character count: 0 below the input field. Write a script that listens for the keyup event on the new-item-input. Each time the user types a key, update the text of the with the ID char-count to show the current length of the text in the input field.

- **Input:** User types "Hello" into the input field.
- **Output (on the webpage):** The text inside the char-count span updates to "5".

Problem 20: Simple Image Carousel

Scenario: You want to create a very simple image gallery where clicking "Next" cycles through a list of images.

Topics: DOM, Array, Event Listener

Problem: Modify the HTML to include an <img> tag with an ID like gallery-img and a "Next" button. Create an array of image URLs. Keep track of the current image index. When the "Next" button is clicked, change the src attribute of the <img> tag to the next URL in the array. If you reach the end of the array, loop back to the first image.

- **Sample Input (as variable values):**
    - imageUrls = ["url1.jpg", "url2.jpg", "url3.jpg"]
- **Input:** User clicks the "Next" button.
- **Output (on the webpage):** The image displayed changes from url1.jpg to url2.jpg. Clicking again changes it to url3.jpg, and clicking again changes it back to url1.jpg.