**Final Project**

**Math Dash**

**Submitted By**

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**Organizer University:** Jagannath University **Venue:** International University of Business, Agriculture and Technology (IUBAT) **Dept./Institute/Centre:** Computer Science and Engineering (CSE) **Unique Batch Number:** 03 **Training Track/Course Name:** Front-End Development (ReactJS)

**Project Description: Math Dash Game**

**1. Project Overview**

**Math Dash** is a fast-paced, browser-based educational game designed to improve users' mental arithmetic skills. Built using HTML, CSS, and JavaScript, the game presents users with randomly generated math expressions. Players must solve them within a limited time, providing both an entertaining and educational experience.

**2. Project Objective**

The main objective of Math Dash is to create an interactive and responsive math quiz game that:

* Enhances quick-thinking and mental math abilities.
* Provides real-time feedback to encourage learning.
* Offers a user-friendly and engaging interface.
* Operates seamlessly across devices (desktop, tablet, mobile).

**3. Features**

* **Random Math Expressions:** Auto-generated arithmetic expressions combiningaddition and subtraction.
* **Real-Time Feedback:** Displays "Right" or "Wrong" with color indicators.
* **Scoring System:** Increments score for each correct answer.
* **Countdown Timer:** Each question has a 20-second limit to increase challenge.
* **Game Over Handling:** Ends the game when time runs out.
* **Play Again Button:** Allows users to restart the game from scratch.
* **Responsive Design:** Fully optimized for all screen sizes and devices.

**4. Technical Details**

**Frontend Technologies Used:**

**HTML:** Structured the content, created semantic layout elements such as score area, expression box, input field, and buttons.

**CSS:** Styled the interface with colors, spacing, shadows, and media queries to ensure responsiveness on mobile and desktop devices.

**JavaScript:** Managed game logic, input validation, DOM manipulation, scoring, expression generation, and timer functionality.

**Core Functional Implementations:**

* **Random Math Expression Generator:**
  + Dynamically generates expressions with 4 to 7 terms.
  + Uses Math.random() for random numbers and operator selection.
  + Evaluates expressions safely using eval() to calculate the correct answer.
* **Real-Time Input Validation:**
  + Listens to user input via input event.
  + Compares user input with the computed result.
  + Displays immediate feedback (“Right” in green or “Wrong” in red).
* **Timer System:**
  + A 25-second countdown is triggered each time a new expression is loaded.
  + Implemented using setInterval() and cleared upon correct input or game over.
  + Timer value updates in the UI every second.
  + If timer reaches 0, it triggers a game over state.
* **Game State Handling:**
  + Maintains score and game-over status using JavaScript variables.
  + Disables input field when the game ends.
  + Displays a “Play Again” button to reset score and start fresh.
* **Responsive Design:**
  + CSS @media queries adjust font sizes and layout for smaller screens.
  + Input fields and buttons scale fluidly using percentage-based widths.
* **Button Visibility Toggle:**
  + "Next" button is hidden when the game ends.
  + "Play Again" button is shown only during the game-over state.
  + Visibility is managed using inline styles (display: none/block) via JavaScript.
* **Score System:**
  + Score increments only for correct answers.
  + Score is reset when the game is restarted.

**5. Future Improvements**

* Add difficulty levels (Easy, Medium, Hard).
* Include sound effects for correct/incorrect answers and game over.
* Leaderboard for high scores.
* Timer animation and progress bar.
* Math expression types beyond addition/subtraction (e.g., multiplication, division).
* Store previous scores using localStorage or backend integration.

**6. Conclusion**

**Math Dash** successfully blends education and entertainment, offering a simple yet engaging way to practice arithmetic under time pressure. With its lightweight design, quick response feedback, and replayability, it serves as both a fun pastime and a valuable brain-training tool. Future enhancements can further improve its learning value and player engagement.