

TEST DOCUMENTATION

Project: Safari Paths (Blue Whales)

Team: s240347, s240904, s240826, s240767, s241008

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Document Owner: Philip (Test Lead)

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1.0 Introduction

This document details the Testing Documentation for the "Safari Paths" game, developed by the Blue Whales team. It outlines the comprehensive testing strategy, procedures, and results used to validate the game's functionality, performance, and adherence to requirements. This document also incorporates specific bugs identified and resolved during the development process, providing a transparent record of quality assurance efforts.

1.1 Purpose

The primary purpose of this Test Documentation is to describe the systematic approach taken to ensure the quality and reliability of the Safari Paths game. It serves as a reference for all testing activities, from test planning and execution to defect tracking and reporting.

- **Who created the document and how?** This document was primarily authored by Philip (Test Lead) with significant contributions from the entire Blue Whales

development team. It was developed iteratively, adapting to the evolving codebase and incorporating lessons learned during debugging and integration phases.

- **Who should read this document?** This document is intended for project stakeholders including academic evaluators, future maintenance teams, and anyone seeking a detailed understanding of the game's testing coverage and quality status.
- **Who is bound by this document (scope of use)?** All team members involved in development, quality assurance, and project management are bound by the testing strategy and procedures outlined herein. It defines the minimum standard for validating the game's quality.

1.2 Summary

Safari Paths is an educational 2D puzzle game built with Godot 4.4 for children aged 1-5. This document details the multi-faceted testing approach, including Unit, Integration, System, UI, and Performance testing. It covers the validation of core puzzle logic, scene transitions, global state management (GameManager.gd), and user interface consistency. A critical focus is placed on error handling and recovery, with specific examples from resolved bugs (such as "null instance" errors, audio conflicts) incorporated into the defect log. The document outlines test environments, tools, key metrics, and a traceability matrix to ensure comprehensive coverage and quality.

1.3 Definitions and Abbreviations (Glossary)

(Refer to Section 1.3 of the Requirements Documentation and Section 1.3 of the Architectural Documentation for a comprehensive glossary.)

- **Acceptance Criteria:** Specific, measurable conditions that must be met for a feature, component, or the entire system to be accepted.
- **Autoload:** A Godot feature to load a script or scene globally at startup, making it a singleton, like GameManager.gd.
- **Defect Log:** A formal record of identified bugs, their status, severity, and resolution details.
- **Exploratory Testing:** A simultaneous learning, test design, and test execution process.
- **Graceful Degradation:** The ability of a system to maintain functionality, possibly at a reduced level, when faced with errors or resource limitations, rather than crashing.
- **KPI (Key Performance Indicator):** Measurable values that demonstrate how effectively a project is achieving key objectives.

- **@onready:** A Godot annotation used to get a node reference when the node and its children are ready in the scene tree. A frequent source of "null instance" errors if paths are incorrect or nodes are missing.
- **Pass Rate:** The percentage of executed test cases that yield expected results.
- **Regression Testing:** Re-running tests after code changes to ensure that new changes have not introduced new bugs or re-introduced old ones.
- **Test Case:** A set of conditions or variables under which a tester will determine if a system under test is working correctly.
- **Test Plan:** A document detailing the scope, objectives, methods, and resources for testing a software product.
- **Traceability Matrix:** A document that links requirements to test cases, design elements, or other project artifacts to ensure comprehensive coverage.
- **UAT (User Acceptance Testing):** Testing conducted by end-users (or representatives of end-users) to confirm the system meets their needs and requirements.

1.4 References and Standards

- **Requirements Documentation (Safari Paths, Summer 2025):** The foundational document detailing functional and non-functional requirements.
- **Architectural Documentation (Safari Paths, Summer 2025):** Provides the system's design and architectural principles.
- **Project Documentation (Safari Paths, Summer 2025):** Outlines the overall project approach, timeline, and lessons learned.
- **SWE_SoSe2025_DELIVERABLES.pdf:** Academic requirements and checklist for project deliverables.
- **Internal Godot Coding Standards:** Team's agreed-upon coding conventions for GDScript, including error handling (for example, @onready null checks) and naming.
- **UI Style Guide:** (As per team action item from 1st June 2025 progress report) Visual standards for consistent UI elements.

1.5 Overview

This document systematically outlines the testing efforts for Safari Paths. It begins by defining the testing strategy and scope. Section 3 details specific test categories: Unit, Integration, System, UI, and Performance, providing concrete test cases. Section 4 focuses on error handling, including a defect log of real bugs and their resolutions, and scenarios for testing graceful degradation. Sections 5 and 6 cover test reporting, metrics, and requirements traceability. Section 7 describes the test environment setup.

The document concludes with appendices containing expanded test details and supporting information.

2.0 TEST STRATEGY & PLAN

2.1 Testing Objectives

- Validate core puzzle logic functionality and game mechanics for Addition, Fruit Sort, Match Letters, and Subtraction tasks.
- Ensure consistent UI state management across all scene transitions (`_WelcomePage.tscn` -> `MonkeyLevel.tscn` -> `LevelTransition.tscn` -> `ElephantLevel.tscn` -> `EndScene.tscn`).
- Verify centralized `GameManager.gd` maintains data integrity (player points, task progress, reset functionality).
- Confirm user interface meets design standards, accessibility requirements, and usability (button responsiveness, visual feedback).
- Validate error handling and system stability, particularly for common runtime issues like null references and resource loading failures.

2.2 Test Scope

2.2.1 In Scope

- Core puzzle gameplay mechanics (Addition, Fruit Sort, Match Letters, Subtraction) logic and user interaction.
- UI/UX interactions and scene transitions (`.tscn` loading, `Button` and `TextureButton` functionality, `TextureRect` display, `Label` updates, layout responsiveness, prevention of Cumulative Layout Shifts - CLS).
- `GameManager.gd` state management (point accumulation, `task_points` progress tracking, reset game state across restarts).
- Asset loading and rendering (character sprites like `monkey_neutral.png`, fruit textures, button images, background images).
- Audio system integration (button clicks `button-click.mp3`, correct/incorrect feedback `Girl Saying Excellent.mp3`, background music `Kalahari_Dreaming.mp3`, level complete sounds `Girl Saying Let's Do It Again.mp3`) and proper stopping/starting (`GameManager.gd`'s responsibility).
- Error handling and graceful degradation for anticipated runtime issues (for example, `@onready` path issues, null instance calls to nodes or audio players).

2.2.2 Out of Scope

- Third-party library internals (for example, Godot Engine's core functionality beyond exposed APIs).

- Platform-specific optimizations beyond core Godot functionality (unless explicitly causing a bug on the primary development platform).
- Network functionality (not applicable for this single-player game).
- Persistent Save/Load game state (beyond the current session; game always resets on restart/quit as per design).
- User account management.
- Advanced graphics or 3D elements.
- External API integrations.

2.3 Test Environments

- **Development Environment:** Godot Engine 4.x, Windows 10 (primary development platform for initial coding and debugging). Also tested on macOS and partially on Linux for basic compatibility.
- **Testing Environment:** A clean build environment on a standard development machine (meeting recommended requirements) is used for dedicated testing sessions.
- **Integration Environment:** Full asset deployment and a compiled game executable are used for end-to-end testing, replicating final build conditions.

2.4 Testing Tools & Frameworks

- **Godot Engine's Built-in Debugger:** Used extensively for runtime error analysis, script debugging, and inspecting variable states.
- **Godot Console Output:** Crucial for identifying `print()` messages, warnings, and error logs (for example, "Node not found" errors related to `@onready` paths).
- **Manual Testing Checklists:** Employed for systematic feature verification and regression testing.
- **Exploratory Testing:** Performed regularly to uncover unexpected behaviors and edge cases.
- **Internal Defect Log:** A structured record (Section 4.1) used to track identified bugs, their status, priority, and resolution details.
- **Performance Monitoring Tools:** Godot's built-in Profiler (Debugger tab, Monitor section) for real-time FPS, memory, and CPU usage monitoring.

3.0 TEST CASES

3.1 Unit Test Cases

Focuses on validating individual components in isolation.

3.1.1 Puzzle Logic Tests

- **Test Suite:** Task Mechanics
- **Components:** AdditionTask.gd, FruitSortTask.gd, MatchLettersTask.gd, SubtractionTask.gd

Test ID: UT-001

- **Description:** Validate Addition Task math logic and correct answer handling.
- **Preconditions:** AdditionTask.tscn loaded, game not finished.
- **Test Steps:**
 - Initialize task.
 - Observe question_label for generated numbers (for instance, "What is 2 + 3?").
 - Click the button corresponding to the correct sum (for example, 5).
 - Repeat steps 2-3 two more times.
- **Expected Result:**
 - For each correct answer:
 - GameManager.player_points increments by 100.
 - The task_completed signal (100, true) is emitted.
 - After 3 correct answers:
 - question_label updates to "Great job! Addition task complete!".
 - All buttons disable.
 - The task_completed signal (0, true) is emitted for final completion.
 - Overall: Correct sums are identified, points awarded, task completes after 3 correct answers, UI updates as expected.
- **Priority:** High

Test ID: UT-002

- **Description:** Validate Fruit Sort Task correct fruit detection and reshuffle logic.
- **Preconditions:** FruitSortTask.tscn loaded, game not finished.
- **Test Steps:**
 - Initialize task.
 - Identify a "good" fruit (for instance, Appleg.png).
 - Click the "good" fruit button.
 - Repeat steps 2-3 two more times for other "good" fruits.
 - Click a "bad" fruit.
- **Expected Result:**
 - For each "good" fruit picked:

- GameManager.player_points increments by 100.
 - The picked fruit button disables.
- After the third "good" fruit:
 - instruction label updates to "Great job! Fruit sorting task complete!".
 - All buttons disable.
- When a "bad" fruit is clicked:
 - It disables/disappears.
 - New fruits are generated to replace it, without re-enabling previously picked "good" fruits (related to Bug ID: PD-006 fix).
- Overall: Good fruits are correctly identified, points awarded, task completes after 3 good fruits. Reshuffle mechanism ensures new good fruits appear if needed, and *only* new fruits replace bad picks without affecting prior good picks. UI updates.
- **Priority:** High

Test ID: UT-003

- **Description:** Validate Match Letters Task correct letter-to-color matching and selection logic.
- **Preconditions:** MatchLettersTask.tscn loaded, game not finished.
- **Test Steps:**
 - Initialize task.
 - Identify a letter (for instance, 'B') and its corresponding color (Blue button).
 - Click the 'B' letter button.
 - Click the Blue color button.
 - Repeat for all 5 pairs.
 - Click an incorrect letter, then an incorrect color.
- **Expected Result:**
 - Upon selecting a letter:
 - Other letter buttons disable.
 - Color buttons enable.
 - For each correct pair match:
 - GameManager.player_points increments by 100.
 - Both the letter and color buttons disable permanently and get a blue border.
 - After 5 correct matches:
 - instruction_label updates to "Great job! You matched all!".
 - When an incorrect pair is clicked:
 - Both buttons briefly show a red border.

- Both buttons reset to their initial unselected state (related to Bug ID: PD-007 fix).
 - Overall: Correct pairs match, points awarded, buttons disable, visual feedback for selection and match works. Incorrect selections reset correctly.
- **Priority:** High

Test ID: UT-004

- **Description:** Validate Subtraction Task math logic and correct answer handling.
- **Preconditions:** SubtractionTask.tscn loaded, game not finished.
- **Test Steps:**
 - Initialize task.
 - Observe question_label for generated numbers (for instance, "What is 4 - 2?").
 - Click the button corresponding to the correct difference (for example, 2).
 - Repeat steps 2-3 two more times.
- **Expected Result:**
 - For each correct answer:
 - GameManager.player_points increments by 100.
 - After 3 correct answers:
 - question_label updates to "Great job! Subtraction task complete!".
 - All buttons disable.
 - Overall: Correct differences are identified, points awarded, task completes after 3 correct answers, UI updates.
- **Priority:** High

3.1.2 GameManager State Tests

- **Test Suite:** State Management
- **Component:** GameManager.gd (Autoload singleton)

Test ID: UT-101

- **Description:** Verify GameManager.award_points correctly accumulates player points and task points.
- **Preconditions:** GameManager autoloading and properly configured.
- **Test Steps:**
 - In _ready() of Monkey_Level.gd, print initial GameManager.player_points and GameManager.task_points["monkey_addition"].

- Simulate 3 correct answers for monkey_addition via `_on_task_completed(100, true)` calls (for example, manually trigger the signal from a debugger or a test script).
- Simulate an incorrect answer `_on_task_completed(0, false)`.
- **Expected Result:**
 - `GameManager.player_points` becomes 300 after 3 correct answers.
 - `GameManager.task_points["monkey_addition"]` becomes 300 after 3 correct answers.
 - `GameManager.player_points` and `GameManager.task_points["monkey_addition"]` do not change after an incorrect answer.
 - Overall: Points correctly accumulate for positive awards, remain unchanged for zero/negative awards.
- **Priority:** High

Test ID: UT-102

- **Description:** Verify `GameManager.reset_game_state()` correctly resets all game-related variables (`player_points` and `task_points`).
- **Preconditions:** Game has accumulated points and task progress (`GameManager` state is non-zero).
- **Test Steps:**
 - Play through `MonkeyLevel` and `ElephantLevel` to accumulate points (for example, total 1400 points) and set task progress.
 - Transition to `EndScene.tscn`.
 - Click the "Play Again" (`RestartButton`).
 - Game restarts to `_WelcomePage.tscn`.
 - Start a new game session (transition to `MonkeyLevel.tscn`).
 - In `Monkey_Level.gd _ready()`, print `GameManager.player_points` and all `GameManager.task_points` values.
- **Expected Result:**
 - `GameManager.player_points` is 0.
 - All entries in `GameManager.task_points` are reset to 0.
 - Overall: `GameManager.player_points` is 0, and all entries in `GameManager.task_points` are reset to 0.
- **Priority:** Critical

3.2 Integration Test Cases

Focuses on validating interactions between integrated components.

3.2.1 Scene Transition Integration Tests

- **Test Suite:** Scene Management
- **Components:** _WelcomePage.gd, Monkey_Level.gd, Level_Transition.gd, Elephant_Level.gd, End_Scene.gd, and their corresponding .tscn files.

Test ID: IT-001

- **Description:** Validate smooth and correct scene transitions (Welcome -> MonkeyLevel -> LevelTransition -> ElephantLevel -> EndScene).
- **Preconditions:** Game launched from _WelcomePage.tscn, all scene paths in scripts are accurate (verified during fixes for Bug ID: PD-002, PD-003, PD-005, PD-010).
- **Test Steps:**
 - Launch game.
 - Click "Play" on _WelcomePage.tscn.
 - Complete both tasks in MonkeyLevel.tscn.
 - Click "Continue" on LevelTransition.tscn.
 - Complete both tasks in ElephantLevel.tscn.
- **Expected Result:**
 - Transition from _WelcomePage.tscn to MonkeyLevel.tscn occurs correctly.
 - Transition from MonkeyLevel.tscn to LevelTransition.tscn occurs correctly.
 - Transition from LevelTransition.tscn to ElephantLevel.tscn occurs correctly.
 - Transition from ElephantLevel.tscn to EndScene.tscn occurs correctly.
 - All transitions occur without crashes or "null instance" errors.
 - The correct scene loads each time.
 - The game flow matches the design.
 - Console should show no "Node not found" errors.
- **Priority:** Critical

Test ID: IT-002

- **Description:** Verify UI elements (HUD, character sprites) update correctly across scene transitions and game states.
- **Preconditions:** Game running with active state.
- **Test Steps:**
 - Start game.
 - Accumulate points in MonkeyLevel (for example, 200 points).

- Trigger transition to LevelTransition.tscn.
- Trigger transition to ElephantLevel.tscn.
- Perform actions in ElephantLevel (correct/incorrect).
- Perform actions in MonkeyLevel (correct/incorrect).
- **Expected Result:**
 - HUD PointsLabel shows current points in MonkeyLevel.
 - HUD PointsLabel in ElephantLevel displays the accumulated 200 points.
 - Elephant character sprite changes appropriately (elephant_neutral.png, elephant_sad.png) based on correctness.
 - Monkey character sprite changes appropriately based on correctness.
 - Overall: HUD points persist and update correctly across scenes. Character sprites change appropriately in their respective levels based on correctness.
- **Priority:** High

3.2.2 Audio System Integration Tests

- **Test Suite:** Audio Management
- **Components:** GameManager.gd, _WelcomePage.gd, Monkey_Level.gd, Level_Transition.gd, Elephant_Level.gd, End_Scene.gd, all task scripts, and associated AudioStreamPlayer nodes.

Test ID: IT-A01

- **Description:** Verify background music playback, stopping, and transitions across levels.
- **Preconditions:** All AudioStreamPlayer nodes for background music are correctly configured as children of GameManager (Autoload) or scene-specific nodes. Audio paths (for example, res://assets/audio/Ghana_to_Mississippi.mp3) are accurate.
- **Test Steps:**
 - Launch game.
 - Click "Play".
 - Enter MonkeyLevel.tscn.
 - Complete MonkeyLevel tasks and transition to LevelTransition.tscn.
 - Click "Continue" on LevelTransition.tscn to enter ElephantLevel.tscn.
 - Complete ElephantLevel tasks and transition to EndScene.tscn.
- **Expected Result:**
 - Ghana_to_Mississippi.mp3 plays on _WelcomePage.tscn.
 - Ghana_to_Mississippi.mp3 stops when "Play" is clicked.

- Kalahari_Dreaming.mp3 starts playing when entering MonkeyLevel.tscn.
- Kalahari_Dreaming.mp3 stops when transitioning to LevelTransition.tscn.
- Ghana_to_Mississippi.mp3 starts playing when entering ElephantLevel.tscn.
- Ghana_to_Mississippi.mp3 stops when transitioning to EndScene.tscn.
- Overall: Background music plays and stops correctly with scene changes, preventing overlapping tracks (related to Bug ID: PD-008 fix). Console should show no "AudioStreamPlayer not ready" errors.
- **Priority:** High

Test ID: IT-A02

- **Description:** Verify feedback and general button click sounds play correctly.
- **Preconditions:** All AudioStreamPlayer nodes for sound effects are correctly configured as children of GameManager (Autoload).
- **Test Steps:**
 - Click "Play" on _WelcomePage.tscn.
 - In AdditionTask.tscn: Click a correct answer button.
 - In AdditionTask.tscn: Click an incorrect answer button.
 - Click any interactive button in any task, LevelTransition, or EndScene.
 - Complete MonkeyLevel.
 - Complete ElephantLevel.
- **Expected Result:**
 - button-click.mp3 plays when "Play" is clicked.
 - Girl Saying Excellent.mp3 (correct sound) plays for a correct answer in AdditionTask.tscn.
 - Boy Saying Awesome.mp3 (incorrect sound) plays for an incorrect answer in AdditionTask.tscn.
 - button-click.mp3 plays for any interactive button click in any task, LevelTransition, or EndScene.
 - Girl Saying Let's Do It Again.mp3 (level complete sound) plays on LevelTransition.tscn after MonkeyLevel completion.
 - Girl Saying Let's Do It Again.mp3 (level complete sound) plays on EndScene.tscn after ElephantLevel completion.
 - Overall: All intended sound effects play at the correct times and do not conflict.
- **Priority:** High

3.3 System Test Cases

Verifies the complete, integrated system to ensure it meets all specified requirements.

3.3.1 End-to-End Gameplay Flow Test

- **Test Suite:** Complete Game Experience
- **Scope:** Full application

Test ID: ST-001

- **Description:** Complete gameplay session from start to finish, including restart functionality.
- **Preconditions:** Clean installation, all scenes and scripts correctly configured and referenced.
- **Test Steps:**
 - Launch game.
 - Click "Play" on _WelcomePage.tscn.
 - Complete all tasks in MonkeyLevel.tscn (Addition and Fruit Sort).
 - Click "Continue" on LevelTransition.tscn.
 - Complete all tasks in ElephantLevel.tscn (Match Letters and Subtraction).
 - Click "Play Again (RestartButton`).
 - Start a new game session.
 - Click "Quit Game" on EndScene.tscn.
- **Expected Result:**
 - Seamless experience, no crashes or freezes.
 - All transitions and features (including restart and quit) work as designed.
 - Game transitions to EndScene.tscn after ElephantLevel completion.
 - Game returns to _WelcomePage.tscn after "Play Again" is clicked.
 - GameManager points are reset to 0 after "Play Again" is clicked.
 - Point accumulation works from 0 again in the new session.
 - Game quits successfully when "Quit Game" is clicked.
- **Priority:** Critical

3.3.2 Stress Test

- **Test Suite:** Performance & Stability
- **Scope:** Full application under prolonged use.

Test ID: ST-002

- **Description:** Verify game stability and performance during an extended, continuous gameplay session.

- **Preconditions:** Stable game build.
- **Test Steps:**
 - Start a new game session and play continuously for at least 2 hours.
 - During gameplay, repeatedly execute common actions (for example, clicking, scene transitions).
 - Monitor performance metrics (FPS, memory usage, CPU usage) using Godot's profiler.
- **Expected Result:**
 - Stable performance throughout extended gameplay sessions (consistent FPS, no significant memory growth).
 - No unexpected crashes or freezes.
 - Game logic, UI, and audio remain consistent over time.
- **Priority:** Medium

3.4 User Interface Test Cases

Verifies the visual design, consistency, and interactive functionality of the UI.

3.4.1 UI Consistency & Style Guide Compliance Tests

- **Test Suite:** User Interface Visuals
- **Components:** All UI nodes (Button, TextureButton, Label, TextureRect, GridContainer, HBoxContainer, VBoxContainer, CanvasLayer).

Test ID: UI-001

- **Description:** Verify consistency of button colors, borders, text/texture display, and overall layout across all tasks and screens, adhering to the UI Style Guide.
- **Preconditions:** Load each scene (_WelcomePage.tscn, LevelTransition.tscn, EndScene.tscn) and task scene (AdditionTask.tscn, FruitSortTask.tscn, MatchLettersTask.tscn, SubtractionTask.tscn) individually.
- **Test Steps:**
 - Verify _WelcomePage.tscn PlayButton and LevelTransition.tscn ContinueButton display yellowContinuebutton.png.
 - Verify EndScene.tscn RestartButton displays RestartButton.png and QuitButton displays Quitbtn.png.
 - Load MatchLettersTask.tscn.
 - Load AdditionTask.tscn, SubtractionTask.tscn.
 - Load FruitSortTask.tscn.
 - Resize the game window.

- Verify font consistency (sizes, families, colors) across all Label nodes.
- **Expected Result:**
 - Color buttons in MatchLettersTask.tscn display their respective COLORS_MAP color (no text) and have no border when unselected.
 - A green border appears when a letter/color button is selected in MatchLettersTask.tscn.
 - A blue border appears when a letter/color pair is matched in MatchLettersTask.tscn (related to Bug ID: PD-007 fix for border and reset).
 - Answer buttons in AdditionTask.tscn and SubtractionTask.tscn are uniform in appearance and have no borders.
 - Fruit buttons in FruitSortTask.tscn display fruit textures (.png files) and have no borders.
 - UI elements and layouts adjust responsively without overlapping or breaking when the window is resized (prevention of CLS).
 - Font consistency (sizes, families, colors) is maintained across all Label nodes.
 - Overall: Button styling, border behavior, and texture/color display are consistent with current design specifications across all scenes. UI elements respond correctly to resizing.
- **Priority:** High

3.4.2 Interactive Element Functionality Tests

- **Test Suite:** User Interface Interaction
- **Components:** All interactive UI elements.

Test ID: UI-002

- **Description:** Verify all interactive elements correctly register clicks/taps and trigger the appropriate game logic and feedback.
- **Preconditions:** Game loaded to any interactive scene (menus, levels, tasks).
- **Test Steps:**
 - Click every interactive button in the game (Button, TextureButton instances).
 - For elements like FruitSortTask or MatchLettersTask, perform rapid successive clicks.
- **Expected Result:**
 - Appropriate visual feedback (for example, button press animation, character expression change) is provided for each click.
 - Audio feedback (button-click.mp3) is provided for each click.

- The correct action is performed (for example, scene change, answer validation, points awarded).
- Responsiveness and proper state updates are maintained during rapid successive clicks.
- Overall: All interactive elements work as designed, providing correct feedback and executing intended actions without lag or missed inputs.
- **Priority:** High

3.5 Performance Test Cases

Evaluates the game's efficiency and responsiveness under various conditions.

3.5.1 Response Time Tests

- **Test Suite:** Performance Validation
- **Environment:** Performance testing setup (standard development machine).

Test ID: PT-001

- **Description:** Benchmark loading times for game startup, level loading, and scene transitions.
- **Performance Criteria:**
 - Game startup (to _WelcomePage.tscn): ≤ 3 seconds.
 - Level loading (for example, MonkeyLevel.tscn, ElephantLevel.tscn): ≤ 1.5 seconds.
 - Scene transition (LevelTransition.tscn): ≤ 1 second.
 - Match processing time (user input to feedback): ≤ 100 ms.
- **Measurement Method:**
 - Manual stopwatch measurements for load and transition times.
 - Godot's profiler for specific frame-by-frame processing.
 - Average times calculated from 10 consecutive operations across multiple test runs.
- **Expected Result:** All measured times meet or exceed the specified performance criteria.
- **Priority:** High

3.5.2 Resource Usage Tests

- **Test Suite:** Performance Validation
- **Environment:** Performance testing setup (standard development machine).

Test ID: PT-002

- **Description:** Monitor runtime resource consumption (frame rate, memory, CPU usage).
- **Performance Criteria:**
 - Frame rate: Consistent ≥ 30 FPS (target 60 FPS) during active gameplay.
 - Peak memory usage: ≤ 120 MB (stable after initial load).
 - Average CPU usage: $\leq 35\%$ during active gameplay.
- **Measurement Method:**
 - Monitoring FPS using Godot's debugger (Monitor tab).
 - Tracking memory usage over an extended gameplay session using Godot's profiler and system task manager.
 - Monitoring CPU utilization patterns during different game states (idle, active task).
- **Expected Result:** Performance meets all benchmarks across all monitored metrics without significant degradation over time.
- **Priority:** Medium

4.0 ERROR HANDLING & RECOVERY TESTING

This section details the identified defects during development and specific test scenarios to ensure robust error handling and graceful recovery.

4.1 Defect Log (Real Bugs & Resolutions)

The following table summarizes key bugs encountered during development and debugging, along with their resolution, demonstrating the team's commitment to quality.

Bug ID	Date Found	Found By	Related Test ID	Severity	Component	Summary	Description	Resolution	Verified By	Date Closed
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PD-002	2025-05	Team Lead	IT-001	Critical	Level_Transition.gd	Node path errors causing scene transition failures.	Level_Transition.gd failed to find @onready nodes, leading to "null instance" errors and preventing seamless transitions to the next level.	Corrected node paths (\$VBoxContainer/ContinueButton) and added robust null checks for @onready variables. Ensured all referenced nodes existed in the scene tree.	Philip	2025-06-07
PD-003	2025-06-05	Team Lead	IT-001	High	Level_Transition.gd	Inconsistent scene loading due to path issues.	Similar to PD-002, specific path references in change_scene_to_file() were occasionally incorrect, leading to failed scene loads and crashes.	Standardized all scene path references to use res://scenes/levels/ prefix and verified correctness during integration checks.	Philip	2025-06-07

P D - 0 0 5	2 0 2 5 - 0 6 - 1 0	Q A L e a d	S T- 0 0 1	Hi gh	End_Scen e.gd	UI elemen ts not loading /displa ying on EndSc ene.tsc n.	End_Scene .gd was unable to properly reference its @onready UI elements (for example, RestartBut ton, Quitbtn.pn g), resulting in a blank or incomplet e end screen.	Verified node names and paths in EndScene.tscn matched script references. Added null checks (if button: button.show()) to ensure graceful handling if a UI element was missing.	P hil ip	2 0 2 5- 0 6- 1 2
P D - 0 0 6	2 0 2 5 - 0 6 - 0 8	D e v	U T- 0 0 2	M ed iu m	FruitSort Task.gd	Incorre ct fruit reshuff ling logic after bad pick.	After picking a "bad" fruit, the reshuffle logic sometime s re-enabled previously picked "good" fruits or did not correctly replace the bad fruit, confusing the player.	Modified the reshuffling algorithm to ensure already-picked "good" fruits remain disabled. Logic now correctly replaces only the picked "bad" fruit with a new random one from the unpicked pool.	P hil ip	2 0 2 5- 0 6- 1 0

P D - 0 0 7	2 0 2 5 - 0 6 - 1 0	D e v	U T- 0 0 3	M e d i u m	MatchLet tersTask. gd	Inconsi stent button state and border clearin g.	Incorrect letter/colo r selections did not properly reset button borders or re-enable other letter/colo r buttons, leading to stuck states or visual clutter.	Refined the _check_match() logic to explicitly reset button borders to default and re-enable appropriate buttons when an incorrect match is made, allowing new selections.	P hil ip	2 0 2 5- 0 6- 1 2
P D - 0 0 8	2 0 2 5 - 0 6 - 1 0	D e v	IT- A 0 1, IT- A 0 2	Hi gh	GameMa nager.gd	Audio playba ck issues (overla pping, not playing).	Backgroun d music sometime s overlapped during scene transitions, or sound effects failed to play because the AudioStrea mPlayer was not ready.	Centralized AudioStreamPla yer nodes under GameManager. gd. Implemented explicit stop_backgroun d_music() before scene changes and ensured play() calls were guarded (if is_ready(): play()).	P hil ip	2 0 2 5- 0 6- 1 2

P D - 0 1 0	2 0 2 5 - 0 6 - 1 5	Q A L e a d	S T- 0 0 1	Hi gh	End_Scen e.gd	Repeat ed null referen ce errors in EndSc ene during restart loop.	Even after initial fixes, repeated Play Again clicks from EndScene occasional ly triggered null instance errors, indicating a race condition or improper node setup on scene reload.	Implemented more robust _ready() and _exit_tree() handling in End_Scene.gd to ensure all UI nodes are properly referenced and released, preventing issues on rapid re-instantiation.	P hil ip	2 0 2 5- 0 6- 1 7
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4.2 Error Scenarios & Testing

These scenarios specifically target common error conditions to verify the game's resilience and graceful recovery.

4.2.1 Missing Node Reference (ER-001)

- **Description:** Verify the game handles attempts to access non-existent nodes gracefully.
- **Preconditions:** Debug build enabled (to see console logs), and a specific @onready node path in a script (for example, Monkey_Level.gd or End_Scene.gd) is intentionally broken (for example, by renaming the node in the .tscn file).
- **Test Steps:**
 - Launch the game.
 - Navigate to the scene containing the intentionally broken @onready path.
 - Attempt to interact with the UI or trigger logic that depends on the missing node.
- **Expected Result:**
 - The game does NOT crash or freeze.

- A "Node not found" or "null instance" error message is logged to the Godot console.
- The user experience is stable; the game might exhibit degraded functionality (for example, a button doesn't appear or react), but core navigation remains possible.
- **Priority:** High

4.2.2 Missing Audio File (ER-002)

- **Description:** Verify the game handles attempts to play audio from non-existent file paths gracefully.
- **Preconditions:** A specific audio file (for example, button-click.mp3 or Kalahari_Dreaming.mp3) is intentionally renamed or deleted from res://assets/audio/.
- **Test Steps:**
 - Launch the game.
 - Perform an action that should trigger the missing audio file (for example, click a button, enter MonkeyLevel).
- **Expected Result:**
 - The game does NOT crash or freeze.
 - An audio loading error or warning is logged to the Godot console.
 - The game continues to function normally, but the specific audio sound is absent. Other audio (if present) should continue to play correctly.
- **Priority:** Medium

4.2.3 Incorrect Asset Path (ER-003)

- **Description:** Verify the game handles attempts to load visual assets from incorrect paths gracefully.
- **Preconditions:** A visual asset (for example, monkey_neutral.png or a fruit texture) referenced by a TextureRect or TextureButton is intentionally renamed or moved.
- **Test Steps:**
 - Launch the game.
 - Navigate to the scene where the affected visual asset should be displayed.
- **Expected Result:**
 - The game does NOT crash or freeze.
 - A "Texture loading failed" or similar error/warning is logged to the Godot console.
 - The area where the asset should be displayed appears blank, as a default grey box, or a placeholder. The rest of the UI should remain functional.
- **Priority:** Medium

5.0 TEST REPORTING & METRICS

5.1 Test Execution Reporting

- **Execution Logs:** Detailed records of each test case execution, including date, tester, build version, pass/fail status, and observed notes.
- **Defect Log Updates:** All bugs identified during testing are recorded in the defect log (Section 4.1), with immediate updates on their status (for example, New, Open, In Progress, Resolved, Closed).
- **Summary Reports:** Weekly and end-of-phase summary reports are generated, providing an overview of testing progress, key findings, and quality status.

5.2 Test Metrics & KPIs

- **Test Case Pass Rate:** Calculated as (Number of Passed Test Cases / Total Number of Test Cases) * 100%. (Target: ≥98%). Achieved: **98.4% (61/62 passed)**.
- **Requirements Coverage:** Percentage of functional and non-functional requirements covered by at least one test case. (Target:). Achieved: 100%.
- **Defect Density:** Number of defects found per KLOC (Thousand Lines of Code) or per feature.
- **Defect Resolution Rate:** Percentage of identified defects that have been resolved and verified. (Target: 100% for Critical/High). Achieved: 100% **for Critical/High, all documented bugs resolved**.
- **Performance Benchmarks:** (Refer to Section 3.5 for specific KPIs like FPS, memory, CPU usage). All established performance benchmarks were met or exceeded.

5.3 Bug Classification & Tracking

- **Severity:**
 - **Critical:** Blocks core functionality, prevents testing of major features (for example, game crashes, unable to transition levels).
 - **High:** Major functional defect, significant impact on user experience, workaround exists but is cumbersome.
 - **Medium:** Minor functional defect, UI glitch, performance issue that doesn't break gameplay.
 - **Low:** Typo, cosmetic issue, very minor usability issue.
- **Priority:**
 - **P1 (Immediate):** Must be fixed before next build/release.
 - **P2 (High):** Should be fixed soon.
 - **P3 (Medium):** Can be fixed in a later sprint.
 - **P4 (Low):** Minor, can be deferred or not fixed.

6.0 REQUIREMENTS TRACEABILITY MATRIX

This section links the game's requirements to specific test cases, ensuring that every functional and non-functional requirement is verified through testing.

6.1 Requirements Coverage Verification

The following table provides a high-level mapping from the Requirements Documentation (Req. Doc.) to the test cases described in this document.

Requirement ID (from Req. Doc.)	Requirement ID (from Req. Doc.)	Requirement ID (from Req. Doc.)	Requirement ID (from Req. Doc.)	Requirement ID (from Req. Doc.)
Description	Description	Description	Description	Description
Acceptance Criteria (from Acc. Doc.)	Acceptance Criteria (from Acc. Doc.)	Acceptance Criteria (from Acc. Doc.)	Acceptance Criteria (from Acc. Doc.)	Acceptance Criteria (from Acc. Doc.)
Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Acceptance Criteria (from Acc. Doc.)
Test Cases (This Doc)	Test Cases (This Doc)	Test Cases (This Doc)	Test Cases (This Doc)	Related Use Cases (from Req. Doc.)
Status	Status	Status	Status	Test Cases (This Doc)
FR 2.1.1	FR 2.1.1	FR 2.1.1	FR 2.1.1	Status
Arithmetic Puzzles (Add/Sub)	Arithmetic Puzzles (Add/Sub)	Arithmetic Puzzles (Add/Sub)	Arithmetic Puzzles (Add/Sub)	FR 2.1.1
Acc. Doc. 3.1.1, 3.1.4	Acc. Doc. 3.1.1, 3.1.4	Acc. Doc. 3.1.1, 3.1.4	Acc. Doc. 3.1.1, 3.1.4	Arithmetic Puzzles (Add/Sub)
UC-5.2.2, UC-5.2.6	UC-5.2.2, UC-5.2.6	UC-5.2.2, UC-5.2.6	UC-5.2.2, UC-5.2.6	Test Cases (This Doc)
UT-001, UT-004, IT-002, ST-001	UT-001, UT-004, IT-002, ST-001	UT-001, UT-004, IT-002, ST-001	UT-001, UT-004, IT-002, ST-001	Status
Verified	Verified	Verified	Verified	FR 2.1.1

FR 2.1.2	Fruit Sorting Task	FR 2.1.2	IT-002, ST-001	Arithmetic Puzzles (Add/Sub)
Fruit Sorting Task	Acc. Doc. 3.1.2	Fruit Sorting Task	Verified	
Acc. Doc. 3.1.2	UC-5.2.3	Acc. Doc. 3.1.2	FR 2.1.2	
UC-5.2.3	UT-002, IT-002, ST-001	UC-5.2.3	Fruit Sorting Task	Acc. Doc. 3.1.1, 3.1.4
UT-002, IT-002, ST-001	Verified	UT-002, IT-002, ST-001	Acc. Doc. 3.1.2	UC-5.2 .2, UC-5.2 .6
Verified	FR 2.1.3	Verified	UC-5.2.3	UT-001 , UT-004 , IT-002, ST-001
FR 2.1.3	Letter-Color Matching Task	FR 2.1.3	UT-002, IT-002, ST-001	Verified
Letter-Color Matching Task	Acc. Doc. 3.1.3	Letter-Color Matching Task	Verified	
Acc. Doc. 3.1.3	UC-5.2.5	Acc. Doc. 3.1.3	FR 2.1.3	Letter-Color Matching Task
UC-5.2.5	UT-003, IT-002, ST-001	UC-5.2.5	Letter-Color Matching Task	Verified
UT-003, IT-002, ST-001	Verified	UT-003, IT-002, ST-001	Acc. Doc. 3.1.3	FR 2.1.2
Verified	FR 2.1.4	Verified	UC-5.2.5	Fruit Sorting Task
FR 2.1.4	Level Progression	FR 2.1.4	UT-003, IT-002, ST-001	Acc. Doc. 3.1.2
Level Progression	Acc. Doc. 3.2	Level Progression	Verified	UC-5.2 .3
Acc. Doc. 3.2	UC-5.2.1, UC-5.2.4, UC-5.2.8	Acc. Doc. 3.2	FR 2.1.4	UT-002 ,
UC-5.2.1, UC-5.2.4, UC-5.2.8	IT-001, ST-001	UC-5.2.1, UC-5.2.4, UC-5.2.8	Level Progression	
IT-001, ST-001	Verified	IT-001, ST-001		
Verified	FR 2.1.5	Verified		
FR 2.1.5	Immediate Feedback	FR 2.1.5		
	Acc. Doc. 3.1.1-3.1.4, 4.2.1			

Immediate Feedback	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6, UC-5.2.7	Immediate Feedback	Acc. Doc. 3.2	IT-002, ST-001
Acc. Doc. 3.1.1-3.1.4, 4.2.1	IT-A01, IT-A02, UI-002	Acc. Doc. 3.1.1-3.1.4, 4.2.1	UC-5.2.1, UC-5.2.4, UC-5.2.8	Verified
UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6, UC-5.2.7	Verified	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6, UC-5.2.7	IT-001, ST-001	FR 2.1.3
IT-A01, IT-A02, UI-002	FR 2.1.6	IT-A01, IT-A02, UI-002	Verified	Letter-Color Matching Task
Verified	Points Tracking	Verified	FR 2.1.5	Acc. Doc. 3.1.3
FR 2.1.6	Acc. Doc. 3.3.1	FR 2.1.6	Immediate Feedback	UC-5.2.5
Points Tracking	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	Points Tracking	Acc. Doc. 3.1.1-3.1.4, 4.2.1	UT-003
Acc. Doc. 3.3.1	UT-101, UT-102, IT-002, ST-001	Acc. Doc. 3.3.1	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6, UC-5.2.7	, IT-002, ST-001
UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	Verified	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	IT-A01, IT-A02, UI-002	Verified
UT-101, UT-102, IT-002, ST-001	FR 2.1.7	UT-101, UT-102, IT-002, ST-001	Verified	FR 2.1.4
Verified	Task Completion Indication	Verified	FR 2.1.6	Level Progression
FR 2.1.7	Acc. Doc. 3.1.1-3.1.4, 3.2	FR 2.1.7	Points Tracking	Acc. Doc. 3.2
Task Completion Indication	UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6	Task Completion Indication	Acc. Doc. 3.3.1	UC-5.2.1, UC-5.2.4,
Acc. Doc. 3.1.1-3.1.4, 3.2	UT-001-UT-004, IT-001, ST-001	Acc. Doc. 3.1.1-3.1.4, 3.2	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	
UC-5.2.2, UC-5.2.3, UC-5.2.4,	Verified	UC-5.2.2, UC-5.2.3, UC-5.2.4,		
	FR 2.1.8			

UC-5.2.5, UC-5.2.6	Retry Mechanism (no penalty)	UC-5.2.5, UC-5.2.6	UT-101, UT-102, IT-002, ST-001	UC-5.2 .8
UT-001-UT-004, IT-001, ST-001	Acc. Doc. 3.1.1-3.1.4	UT-001-UT-004, IT-001, ST-001	Verified	IT-001, ST-001
Verified	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	Verified	FR 2.1.7	Verifie d
FR 2.1.8	UT-001-UT-004	FR 2.1.8	Task Completion Indication	FR 2.1.5
Retry Mechanism (no penalty)	Verified	Retry Mechanism (no penalty)	Acc. Doc. 3.1.1-3.1.4 , 3.2	Immedi ate Feedba ck
Acc. Doc. 3.1.1-3.1.4	FR 2.1.9	Acc. Doc. 3.1.1-3.1.4	UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6	Acc. Doc. 3.1.1-3 .1.4, 4.2.1
UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	Narrative Context	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	UT-001-UT- 004, IT-001, ST-001	UC-5.2 .2, UC-5.2 .3, UC-5.2 .5, UC-5.2 .6, UC-5.2 .7
UT-001-UT-004	Acc. Doc. 3.2	UT-001-UT-004	Verified	IT-A01, IT-A02, UI-002
Verified	UC-5.2.1, UC-5.2.4	Verified	FR 2.1.8	Verifie d
FR 2.1.9	ST-001	FR 2.1.9	Retry Mechanis m (no penalty)	FR 2.1.6
Narrative Context	Verified	Narrative Context	Acc. Doc. 3.1.1-3.1.4	
Acc. Doc. 3.2	FR 2.1.10	Acc. Doc. 3.2	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	
UC-5.2.1, UC-5.2.4	Game Restart/Quit	UC-5.2.1, UC-5.2.4		
ST-001	Acc. Doc. 3.2	ST-001		
Verified	UC-5.2.8	Verified		
FR 2.1.10	UT-102, ST-001	Verified		
Game Restart/Quit	Verified	FR 2.1.10		
Acc. Doc. 3.2	NFR 2.2.1	Game Restart/Quit		
UC-5.2.8	Usability (intuitive UI)			
	Acc. Doc. 4.2.1			
	UC-5.2.1, UC-5.2.2,			

UT-102, ST-001	UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Acc. Doc. 3.2	UT-001-UT-004	Points Tracking
Verified		UC-5.2.8	Verified	Acc. Doc. 3.3.1
NFR 2.2.1	UI-001, UI-002	UT-102, ST-001	FR 2.1.9	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6
Usability (intuitive UI)	Verified	Verified	Narrative Context	UT-101, UT-102, IT-002, ST-001
Acc. Doc. 4.2.1	NFR 2.2.2	NFR 2.2.1	Acc. Doc. 3.2	Verified
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Responsiveness (feedback lag)	Usability (intuitive UI)	UC-5.2.1, UC-5.2.4	Game Restart/Quit
UI-001, UI-002	Acc. Doc. 4.1.1	Acc. Doc. 4.2.1	ST-001	Acc. Doc. 3.2
Verified	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	FR 2.1.10	UC-5.2.8
NFR 2.2.2	PT-001	UI-001, UI-002		UT-102, ST-001
Responsiveness (feedback lag)	Verified	Verified		Verified
Acc. Doc. 4.1.1	NFR 2.2.3	NFR 2.2.2	Acc. Doc. 3.2	FR 2.1.7
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	Performance (FPS, memory)	Responsiveness (feedback lag)	UC-5.2.8	Task Completion Indication
PT-001	Acc. Doc. 4.1.2	Acc. Doc. 4.1.1	UT-102, ST-001	Acc. Doc. 3.1.1-3.1.4, 3.2
Verified	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	Verified	UC-5.2.2, UC-5.2
NFR 2.2.3	PT-002, ST-002	PT-001	NFR 2.2.1	
	Verified		Usability (intuitive UI)	
			Acc. Doc. 4.2.1	

Performance (FPS, memory)	NFR 2.2.4	Verified	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	.3, UC-5.2 .4, UC-5.2 .5, UC-5.2 .6
Acc. Doc. 4.1.2	Visual Design (cohesive assets)	NFR 2.2.3		
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Acc. Doc. 4.2.1	Performance (FPS, memory)	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	UT-001 -UT-00 4, IT-001, ST-001
PT-002, ST-002	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Acc. Doc. 4.1.2	UI-001, UI-002	
Verified	UI-001	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Verified	Verifie d
NFR 2.2.4	Verified	PT-002, ST-002	NFR 2.2.2	FR 2.1.8
Visual Design (cohesive assets)	NFR 2.2.5	Verified	Responsiveness (feedback lag)	
Acc. Doc. 4.2.1	Accessibility (contrast, layouts)	NFR 2.2.4	Acc. Doc. 4.1.1	Retry Mecha nism (no penalty)
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Acc. Doc. 4.2.1, 4.2.2	Visual Design (cohesive assets)	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	Acc. Doc. 3.1.1-3 .1.4
UI-001	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	Acc. Doc. 4.2.1		
Verified	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	PT-001	UC-5.2 .2, UC-5.2 .3, UC-5.2 .5, UC-5.2 .6
NFR 2.2.5	UI-001, ER-001, ER-002, ER-003	UI-001	Verified	
Accessibility (contrast, layouts)	Verified	Verified	NFR 2.2.3	
Acc. Doc. 4.2.1, 4.2.2		NFR 2.2.5	Performan ce (FPS, memory)	
			Acc. Doc. 4.1.2	UT-001 -UT-00 4

UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8 UI-001, ER-001, ER-002, ER-003 Verified		Accessibility (contrast, layouts) Acc. Doc. 4.2.1, 4.2.2 UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8 UI-001, ER-001, ER-002, ER-003 Verified	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8 PT-002, ST-002 Verified NFR 2.2.4 Visual Design (cohesive assets) Acc. Doc. 4.2.1 UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8 UI-001 Verified NFR 2.2.5 Accessibili ty (contrast, layouts) Acc. Doc. 4.2.1, 4.2.2	Verifie d FR 2.1.9 Narrati ve Contex t Acc. Doc. 3.2 UC-5.2 .1, UC-5.2 .4 ST-001 Verifie d FR 2.1.10 Game Restart /Quit Acc. Doc. 3.2 UC-5.2 .8 UT-102 , ST-001 Verifie d
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			<div>UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8</div> <div>UI-001, ER-001, ER-002, ER-003</div> <div>Verified</div>	<div>NFR 2.2.1</div> <div>Usability (intuitive UI)</div> <div>Acc. Doc. 4.2.1</div> <div>UC-5.2 .1, UC-5.2 .2, UC-5.2 .3, UC-5.2 .4, UC-5.2 .5, UC-5.2 .6, UC-5.2 .8</div> <div>UI-001, UI-002</div> <div>Verified</div> <div>NFR 2.2.2</div> <div>Responsiveness (feedback lag)</div>
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				<div>Acc. Doc. 4.1.1</div> <div>UC-5.2 .1, UC-5.2 .2, UC-5.2 .3, UC-5.2 .4, UC-5.2 .5, UC-5.2 .6, UC-5.2 .7, UC-5.2 .8</div> <div>PT-001</div> <div>Verifie d</div> <div>NFR 2.2.3</div> <div>Perfor mance (FPS, memor y)</div> <div>Acc. Doc. 4.1.2</div> <div>UC-5.2 .1, UC-5.2 .2, UC-5.2</div>
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				<p>.3, UC-5.2</p> <p>.4, UC-5.2</p> <p>.5, UC-5.2</p> <p>.6, UC-5.2</p> <p>.8</p> <p>PT-002</p> <p>,</p> <p>ST-002</p> <p>Verifie d</p> <p>NFR 2.2.4</p> <p>Visual Design (cohesi ve assets)</p> <p>Acc. Doc. 4.2.1</p> <p>UC-5.2</p> <p>.1, UC-5.2</p> <p>.2, UC-5.2</p> <p>.3, UC-5.2</p> <p>.4, UC-5.2</p> <p>.5, UC-5.2</p> <p>.6,</p>
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				<p>UC-5.2 .8</p> <p>UI-001</p> <p>Verifie d</p> <p>NFR 2.2.5</p> <p>Access ibility (contra st, layouts)</p> <p>Acc. Doc. 4.2.1, 4.2.2</p> <p>UC-5.2 .1, UC-5.2 .2, UC-5.2 .3, UC-5.2 .4, UC-5.2 .5, UC-5.2 .6, UC-5.2 .7, UC-5.2 .8</p> <p>UI-001, ER-001 , ER-002</p>
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				ER-003 Verified
Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc) Status FR 2.1.1 Arithmetic Puzzles (Add/Sub) Acc. Doc. 3.1.1, 3.1.4 UC-5.2.2, UC-5.2.6 UT-001, UT-004, IT-002, ST-001 Verified FR 2.1.2	Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc) Status FR 2.1.1 Arithmetic Puzzles (Add/Sub) Acc. Doc. 3.1.1, 3.1.4 UC-5.2.2, UC-5.2.6 UT-001, UT-004, IT-002, ST-001 Verified FR 2.1.2 Fruit Sorting Task Acc. Doc. 3.1.2	Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc) Status FR 2.1.1 Arithmetic Puzzles (Add/Sub) Acc. Doc. 3.1.1, 3.1.4 UC-5.2.2, UC-5.2.6 UT-001, UT-004, IT-002, ST-001 Verified FR 2.1.2	Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc) Status FR 2.1.1 Arithmetic Puzzles (Add/Sub) Acc. Doc. 3.1.1, 3.1.4 UC-5.2.2, UC-5.2.6 UT-001, UT-004, IT-002, ST-001	Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc) Status FR 2.1.1 Arithm etic Puzzle

Fruit Sorting Task	UC-5.2.3	Fruit Sorting Task	Verified	s (Add/Sub)
Acc. Doc. 3.1.2	UT-002, IT-002, ST-001	Acc. Doc. 3.1.2	FR 2.1.2	
UC-5.2.3	Verified	UC-5.2.3	Fruit Sorting Task	Acc. Doc. 3.1.1, 3.1.4
UT-002, IT-002, ST-001	FR 2.1.3	UT-002, IT-002, ST-001	Acc. Doc. 3.1.2	UC-5.2. 2, UC-5.2. 6
Verified	Letter-Color Matching Task	Verified	UC-5.2.3	
FR 2.1.3	Acc. Doc. 3.1.3	FR 2.1.3	UT-002, IT-002, ST-001	UT-001, UT-004, IT-002, ST-001
Letter-Color Matching Task	UC-5.2.5	Letter-Color Matching Task	Verified	
Acc. Doc. 3.1.3	UT-003, IT-002, ST-001	Acc. Doc. 3.1.3	FR 2.1.3	Verified
UC-5.2.5	Verified	UC-5.2.5	Letter-Color Matching Task	FR 2.1.2
UT-003, IT-002, ST-001	FR 2.1.4	UT-003, IT-002, ST-001	Acc. Doc. 3.1.3	Fruit Sorting Task
Verified	Level Progression	Verified	UC-5.2.5	Acc. Doc. 3.1.2
FR 2.1.4	Acc. Doc. 3.2	FR 2.1.4	UT-003, IT-002, ST-001	UC-5.2. 3
Level Progression	UC-5.2.1, UC-5.2.4, UC-5.2.8	Level Progression	Verified	UT-002, IT-002, ST-001
Acc. Doc. 3.2	IT-001, ST-001	Acc. Doc. 3.2	FR 2.1.4	Verified
UC-5.2.1, UC-5.2.4, UC-5.2.8	Verified	UC-5.2.1, UC-5.2.4, UC-5.2.8	Level Progressio n	FR 2.1.3
IT-001, ST-001	FR 2.1.5	IT-001, ST-001	Acc. Doc. 3.2	
Verified	Immediate Feedback	Verified		
FR 2.1.5	Acc. Doc. 3.1.1-3.1.4, 4.2.1	FR 2.1.5		
Immediate Feedback	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6, UC-5.2.7	Immediate Feedback		
Acc. Doc. 3.1.1-3.1.4, 4.2.1				

UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6, UC-5.2.7	IT-A01, IT-A02, UI-002	Acc. Doc. 3.1.1-3.1.4, 4.2.1	UC-5.2.1, UC-5.2.4, UC-5.2.8	Letter- Color Matchi ng Task
IT-A01, IT-A02, UI-002	Verified	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6, UC-5.2.7	IT-001, ST-001	Acc. Doc. 3.1.3
Verified	FR 2.1.6	IT-A01, IT-A02, UI-002	Verified	UC-5.2. 5
FR 2.1.6	Points Tracking	Verified	FR 2.1.5	UT-003, IT-002, ST-001
Points Tracking	Acc. Doc. 3.3.1	FR 2.1.6	Immediate Feedback	Verified
Acc. Doc. 3.3.1	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	Points Tracking	Acc. Doc. 3.1.1-3.1.4, 4.2.1	FR 2.1.4
UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	UT-101, UT-102, IT-002, ST-001	Acc. Doc. 3.3.1	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6, UC-5.2.7	Level Progre ssion
UT-101, UT-102, IT-002, ST-001	Verified	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	IT-A01, IT-A02, UI-002	Acc. Doc. 3.2
Verified	FR 2.1.7	UT-101, UT-102, IT-002, ST-001	Verified	UC-5.2. 1, UC-5.2. 4, UC-5.2. 8
FR 2.1.7	Task Completion Indication	Verified	FR 2.1.6	IT-001, ST-001
Task Completion Indication	Acc. Doc. 3.1.1-3.1.4, 3.2	FR 2.1.7	Points Tracking	Verified
Acc. Doc. 3.1.1-3.1.4, 3.2	UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6	Task Completion Indication	Acc. Doc. 3.3.1	FR 2.1.5
UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6	UT-001-UT-004, IT-001, ST-001	Acc. Doc. 3.1.1-3.1.4, 3.2	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	
UT-001-UT-004, IT-001, ST-001	Verified	UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6	UT-101, UT-102,	
Verified	FR 2.1.8			
	Retry Mechanism (no penalty)			
	Acc. Doc. 3.1.1-3.1.4			

FR 2.1.8	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	UT-001-UT-004, IT-001, ST-001	IT-002, ST-001	Immediate Feedback
Retry Mechanism (no penalty)	UT-001-UT-004	Verified	Verified	
Acc. Doc. 3.1.1-3.1.4	Verified	FR 2.1.8	FR 2.1.7	Acc. Doc. 3.1.1-3. 1.4, 4.2.1
UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	FR 2.1.9	Retry Mechanism (no penalty)	Task Completion Indication	
	Narrative Context	Acc. Doc. 3.1.1-3.1.4	Acc. Doc. 3.1.1-3.1.4, 3.2	UC-5.2. 2, UC-5.2. 3, UC-5.2. 5, UC-5.2. 6, UC-5.2. 7
UT-001-UT-004	UC-5.2.1, UC-5.2.4	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6	
Verified	ST-001			
FR 2.1.9	Verified	UT-001-UT-004		
Narrative Context	FR 2.1.10	Verified	UT-001-UT- 004, IT-001, ST-001	IT-A01, IT-A02, UI-002
Acc. Doc. 3.2	Game Restart/Quit	FR 2.1.9	Verified	Verified
UC-5.2.1, UC-5.2.4	Acc. Doc. 3.2	Narrative Context	FR 2.1.8	FR 2.1.6
ST-001	UC-5.2.8	Acc. Doc. 3.2	Retry Mechanism (no penalty)	Points Trackin g
Verified	UT-102, ST-001	UC-5.2.1, UC-5.2.4	Acc. Doc. 3.1.1-3.1.4	Acc. Doc. 3.3.1
FR 2.1.10	Verified	ST-001	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	UC-5.2. 2, UC-5.2. 3, UC-5.2. 5,
Game Restart/Quit	NFR 2.2.1	Verified		
Acc. Doc. 3.2	Usability (intuitive UI)	FR 2.1.10		
UC-5.2.8	Acc. Doc. 4.2.1	Game Restart/Quit		
UT-102, ST-001	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Acc. Doc. 3.2		
Verified		UC-5.2.8	UT-001-UT- 004	
NFR 2.2.1	UI-001, UI-002	UT-102, ST-001		
	Verified			

Usability (intuitive UI)	NFR 2.2.2	Verified	Verified	UC-5.2.6
Acc. Doc. 4.2.1	Responsiveness (feedback lag)	NFR 2.2.1	FR 2.1.9	UT-101, UT-102, IT-002, ST-001
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Acc. Doc. 4.1.1	Usability (intuitive UI)	Narrative Context	Verified
	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	Acc. Doc. 4.2.1	Acc. Doc. 3.2	FR 2.1.7
UI-001, UI-002	PT-001	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	ST-001	Task Completion Indication
Verified	Verified		Verified	
NFR 2.2.2	NFR 2.2.3	UI-001, UI-002	FR 2.1.10	
Responsiveness (feedback lag)	Performance (FPS, memory)	Verified	Game Restart/Quit	Acc. Doc. 3.1.1-3.1.4, 3.2
Acc. Doc. 4.1.1	Acc. Doc. 4.1.2	NFR 2.2.2	Acc. Doc. 3.2	UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Responsiveness (feedback lag)	UC-5.2.8	
	PT-002, ST-002	Acc. Doc. 4.1.1	UT-102, ST-001	
	Verified	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	Verified	
PT-001	NFR 2.2.4		NFR 2.2.1	
Verified	Visual Design (cohesive assets)		Usability (intuitive UI)	
NFR 2.2.3	Acc. Doc. 4.2.1	PT-001		UT-001-UT-004, IT-001, ST-001
Performance (FPS, memory)	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Verified	Acc. Doc. 4.2.1	Verified
Acc. Doc. 4.1.2		NFR 2.2.3		
UC-5.2.1, UC-5.2.2,	UI-001	Performance (FPS, memory)	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4,	FR 2.1.8

UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Verified	Acc. Doc. 4.1.2	UC-5.2.5, UC-5.2.6, UC-5.2.8	Retry Mecha nism (no penalty)
PT-002, ST-002	NFR 2.2.5	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	UI-001, UI-002	Acc. Doc. 3.1.1-3. 1.4
Verified	Accessibility (contrast, layouts)	PT-002, ST-002	Verified	UC-5.2. 2, UC-5.2. 3, UC-5.2. 5, UC-5.2. 6
NFR 2.2.4	Acc. Doc. 4.2.1, 4.2.2	Verified	NFR 2.2.2	UT-001- UT-004
Visual Design (cohesive assets)	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	NFR 2.2.4	Responsive ness (feedback lag)	Verified
Acc. Doc. 4.2.1	UI-001, ER-001, ER-002, ER-003	Visual Design (cohesive assets)	Acc. Doc. 4.1.1	FR 2.1.9
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Verified	Acc. Doc. 4.2.1	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	Narrati ve Contex t
UI-001		UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	PT-001	Acc. Doc. 3.2
Verified		UI-001	Verified	UC-5.2. 1, UC-5.2. 4
NFR 2.2.5		Verified	NFR 2.2.3	ST-001
Accessibility (contrast, layouts)		NFR 2.2.5	Performan ce (FPS, memory)	
Acc. Doc. 4.2.1, 4.2.2		Accessibility (contrast, layouts)	Acc. Doc. 4.1.2	
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6,		Acc. Doc. 4.2.1, 4.2.2	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4,	
		UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4,		

UC-5.2.7, UC-5.2.8 UI-001, ER-001, ER-002, ER-003 Verified		UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8 UI-001, ER-001, ER-002, ER-003 Verified	UC-5.2.5, UC-5.2.6, UC-5.2.8 PT-002, ST-002 Verified NFR 2.2.4 Visual Design (cohesive assets) Acc. Doc. 4.2.1 UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8 UI-001 Verified NFR 2.2.5 Accessibilit y (contrast, layouts) Acc. Doc. 4.2.1, 4.2.2 UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5,	Verified FR 2.1.10 Game Restart /Quit Acc. Doc. 3.2 UC-5.2. 8 UT-102, ST-001 Verified NFR 2.2.1 Usabilit y (intuitiv e UI) Acc. Doc. 4.2.1 UC-5.2. 1, UC-5.2. 2, UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6,
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			UC-5.2.6, UC-5.2.7, UC-5.2.8 UI-001, ER-001, ER-002, ER-003 Verified	UC-5.2. 8 UI-001, UI-002 Verified NFR 2.2.2 Respon siveness (feedba ck lag) Acc. Doc. 4.1.1 UC-5.2. 1, UC-5.2. 2, UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6, UC-5.2. 7, UC-5.2. 8 PT-001 Verified NFR 2.2.3
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				<div>Perfor mance (FPS, memor y)</div> <div>Acc. Doc. 4.1.2</div> <div>UC-5.2. 1, UC-5.2. 2, UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6, UC-5.2. 8</div> <div>PT-002, ST-002</div> <div>Verified</div> <div>NFR 2.2.4</div> <div>Visual Design (cohesi ve assets)</div> <div>Acc. Doc. 4.2.1</div> <div>UC-5.2. 1,</div>
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				<div>UC-5.2. 2, UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6, UC-5.2. 8</div> <div>UI-001</div> <div>Verified</div> <div>NFR 2.2.5</div> <div>Access ibility (contra st, layouts)</div> <div>Acc. Doc. 4.2.1, 4.2.2</div> <div>UC-5.2. 1, UC-5.2. 2, UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6,</div>
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				UC-5.2.7, UC-5.2.8 UI-001, ER-001, ER-002, ER-003 Verified
Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc) Status FR 2.1.1 Arithmetic Puzzles (Add/Sub) Acc. Doc. 3.1.1, 3.1.4 UC-5.2.2, UC-5.2.6	Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc) Status FR 2.1.1 Arithmetic Puzzles (Add/Sub) Acc. Doc. 3.1.1, 3.1.4 UC-5.2.2, UC-5.2.6 UT-001, UT-004, IT-002, ST-001 Verified	Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc) Status FR 2.1.1 Arithmetic Puzzles (Add/Sub) Acc. Doc. 3.1.1, 3.1.4 UC-5.2.2, UC-5.2.6	Requireme nt ID (from Req. Doc.) Description Acceptanc e Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc) Status FR 2.1.1 Arithmetic Puzzles (Add/Sub) Acc. Doc. 3.1.1, 3.1.4	Require ment ID (from Req. Doc.) Descrip tion Accept ance Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc) Status

UT-001, UT-004, IT-002, ST-001	FR 2.1.2	UT-001, UT-004, IT-002, ST-001	UC-5.2.2, UC-5.2.6	FR 2.1.1
Verified	Fruit Sorting Task	Verified	UT-001, UT-004, IT-002, ST-001	Arithm etic Puzzle s (Add/S ub)
FR 2.1.2	Acc. Doc. 3.1.2	FR 2.1.2	Verified	Acc. Doc. 3.1.1, 3.1.4
Fruit Sorting Task	UC-5.2.3	Fruit Sorting Task	FR 2.1.2	UC-5.2. 2, UC-5.2. 6
Acc. Doc. 3.1.2	UT-002, IT-002, ST-001	Acc. Doc. 3.1.2	Fruit Sorting Task	UT-001, UT-004, IT-002, ST-001
UC-5.2.3	Verified	UC-5.2.3	Acc. Doc. 3.1.2	Verified
UT-002, IT-002, ST-001	FR 2.1.3	UT-002, IT-002, ST-001	UC-5.2.3	FR 2.1.2
Verified	Letter-Color Matching Task	Verified	UT-002, IT-002, ST-001	Fruit Sorting Task
FR 2.1.3	Acc. Doc. 3.1.3	FR 2.1.3	Verified	Acc. Doc. 3.1.2
Letter-Color Matching Task	UC-5.2.5	Letter-Color Matching Task	FR 2.1.3	Acc. Doc. 3.1.2
Acc. Doc. 3.1.3	UT-003, IT-002, ST-001	Acc. Doc. 3.1.3	Letter-Colo r Matching Task	UC-5.2. 3
UC-5.2.5	Verified	UC-5.2.5	Acc. Doc. 3.1.3	UT-002, IT-002, ST-001
UT-003, IT-002, ST-001	FR 2.1.4	UT-003, IT-002, ST-001	UC-5.2.5	Verified
Verified	Level Progression	Verified	UT-003, IT-002, ST-001	FR 2.1.2
FR 2.1.4	Acc. Doc. 3.2	FR 2.1.4	Verified	Fruit Sorting Task
Level Progression	UC-5.2.1, UC-5.2.4, UC-5.2.8	Level Progression	Acc. Doc. 3.1.3	Acc. Doc. 3.1.2
Acc. Doc. 3.2	IT-001, ST-001	Acc. Doc. 3.2	UT-003, IT-002, ST-001	UC-5.2. 3
UC-5.2.1, UC-5.2.4, UC-5.2.8	Verified	UC-5.2.1, UC-5.2.4, UC-5.2.8	Verified	UT-002, IT-002, ST-001
IT-001, ST-001	FR 2.1.5	IT-001, ST-001	FR 2.1.4	
Verified	Immediate Feedback	Verified		

FR 2.1.5	Acc. Doc. 3.1.1-3.1.4, 4.2.1	FR 2.1.5	Level Progression	Verified
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UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6, UC-5.2.7	Verified	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6, UC-5.2.7	IT-001, ST-001	Acc. Doc. 3.1.3
IT-A01, IT-A02, UI-002	FR 2.1.6	IT-A01, IT-A02, UI-002	Verified	UC-5.2.5
Verified	Points Tracking	Verified	FR 2.1.5	UT-003, IT-002, ST-001
FR 2.1.6	Acc. Doc. 3.3.1	FR 2.1.6	Immediate Feedback	Verified
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UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	Verified	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	IT-A01, IT-A02, UI-002	Acc. Doc. 3.2
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Verified	Task Completion Indication	Verified	FR 2.1.6	IT-001, ST-001
FR 2.1.7	Acc. Doc. 3.1.1-3.1.4, 3.2	FR 2.1.7	Points Tracking	
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Acc. Doc. 3.1.1-3.1.4, 3.2	UT-001-UT-004, IT-001, ST-001	Acc. Doc. 3.1.1-3.1.4, 3.2		
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UC-5.2.5, UC-5.2.6	Retry Mechanism (no penalty)	UC-5.2.5, UC-5.2.6	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	Verified
UT-001-UT-004, IT-001, ST-001	Acc. Doc. 3.1.1-3.1.4	UT-001-UT-004, IT-001, ST-001		FR 2.1.5
Verified	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	Verified	UT-101, UT-102, IT-002, ST-001	Immedi ate Feedba ck
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Retry Mechanism (no penalty)	Verified	Retry Mechanism (no penalty)	Verified	Acc. Doc. 3.1.1-3. 1.4, 4.2.1
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FR 2.1.9	FR 2.1.10	FR 2.1.9		
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Responsiveness (feedback lag)	Performance (FPS, memory)	Responsiveness (feedback lag)	FR 2.1.10	Acc. Doc. 3.1.1-3. 1.4, 3.2
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UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	UI-001	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Acc. Doc. 4.2.1	FR 2.1.8
	Verified		UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Retry Mecha nism (no penalty)
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				<div>Visual Design (cohesive assets)</div> <div>Acc. Doc. 4.2.1</div> <div>UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8</div> <div>UI-001</div> <div>Verified</div> <div>NFR 2.2.5</div> <div>Accessibility (contrast, layouts)</div> <div>Acc. Doc. 4.2.1, 4.2.2</div>
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				UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8 UI-001, ER-001, ER-002, ER-003 Verified
Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc) Status	Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc) Status FR 2.1.1	Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc) Status	Requireme nt ID (from Req. Doc.) Description Acceptanc e Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc)	Require ment ID (from Req. Doc.) Descrip tion Accept ance Criteria (from Acc. Doc.) Related Use

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NFR 2.2.1	Responsiveness (feedback lag)	NFR 2.2.1		
Usability (intuitive UI)	Acc. Doc. 4.1.1	Usability (intuitive UI)	FR 2.1.9	UT-101, UT-102, IT-002, ST-001
Acc. Doc. 4.2.1	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	Acc. Doc. 4.2.1	Narrative Context	Verified
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	PT-001	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Acc. Doc. 3.2	
	Verified		UC-5.2.1, UC-5.2.4	FR 2.1.7
UI-001, UI-002	NFR 2.2.3	UI-001, UI-002	ST-001	Task Completion Indication
Verified	Performance (FPS, memory)	Verified	Verified	
NFR 2.2.2	Acc. Doc. 4.1.2	NFR 2.2.2	FR 2.1.10	
Responsiveness (feedback lag)	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Responsiveness (feedback lag)	Game Restart/Quit	Acc. Doc. 3.1.1-3.1.4, 3.2
Acc. Doc. 4.1.1		Acc. Doc. 4.1.1	Acc. Doc. 3.2	UC-5.2.2,

UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	PT-002, ST-002 Verified NFR 2.2.4 Visual Design (cohesive assets)	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	UC-5.2.8 UT-102, ST-001 Verified NFR 2.2.1	UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6
PT-001 Verified NFR 2.2.3 Performance (FPS, memory) Acc. Doc. 4.1.2	Acc. Doc. 4.2.1 UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8 UI-001 Verified NFR 2.2.5	PT-001 Verified NFR 2.2.3 Performance (FPS, memory) Acc. Doc. 4.1.2	Usability (intuitive UI) Acc. Doc. 4.2.1 UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8 UI-001, UI-002 Verified NFR 2.2.2	UT-001- UT-004, IT-001, ST-001 Verified FR 2.1.8 Retry Mecha nism (no penalty) Acc. Doc. 3.1.1-3. 1.4
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Accessability (contrast, layouts) Acc. Doc. 4.2.1, 4.2.2	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	UI-001, UI-002 Verified NFR 2.2.2	UC-5.2. 2, UC-5.2. 3, UC-5.2. 5, UC-5.2. 6
PT-002, ST-002 Verified NFR 2.2.4 Visual Design (cohesive assets) Acc. Doc. 4.2.1	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8 UI-001, ER-001, ER-002, ER-003 Verified	PT-002, ST-002 Verified NFR 2.2.4 Visual Design (cohesive assets) Acc. Doc. 4.2.1	Responsiveness (feedback lag) Acc. Doc. 4.1.1 UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6,	UT-001- UT-004 Verified
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5,		UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5,	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6,	

UC-5.2.6, UC-5.2.8		UC-5.2.6, UC-5.2.8	UC-5.2.7, UC-5.2.8	FR 2.1.9
UI-001		UI-001	PT-001	Narrati ve Contex t
Verified		Verified	Verified	
NFR 2.2.5		NFR 2.2.5	NFR 2.2.3	Acc. Doc. 3.2
Accessibility (contrast, layouts)		Accessibility (contrast, layouts)	Performan ce (FPS, memory)	UC-5.2. 1, UC-5.2. 4
Acc. Doc. 4.2.1, 4.2.2		Acc. Doc. 4.2.1, 4.2.2	Acc. Doc. 4.1.2	ST-001
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UI-001, ER-001, ER-002, ER-003		UI-001, ER-001, ER-002, ER-003	PT-002, ST-002	FR 2.1.10
Verified		Verified	Verified	Game Restart /Quit
			NFR 2.2.4	Acc. Doc. 3.2
			Visual Design (cohesive assets)	UC-5.2. 8
			Acc. Doc. 4.2.1	UT-102, ST-001
			UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5,	Verified
				NFR 2.2.1
				Usabilit y

			UC-5.2.6, UC-5.2.8	(intuitive UI)
			UI-001	Acc. Doc.
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			NFR 2.2.5	UC-5.2. 1,
			Accessibility (contrast, layouts)	UC-5.2. 2,
			Acc. Doc. 4.2.1, 4.2.2	UC-5.2. 3,
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			UI-001, ER-001, ER-002, ER-003	UI-001, UI-002
			Verified	Verified
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				Responsiveness (feedback lag)
				Acc. Doc. 4.1.1
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				<div>3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6, UC-5.2. 7, UC-5.2. 8</div> <div>PT-001</div> <div>Verified</div> <div>NFR 2.2.3</div> <div>Perfor mance (FPS, memor y)</div> <div>Acc. Doc. 4.1.2</div> <div>UC-5.2. 1, UC-5.2. 2, UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6, UC-5.2. 8</div>
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				<div>PT-002, ST-002</div> <div>Verified</div> <div>NFR 2.2.4</div> <div>Visual Design (cohesi ve assets)</div> <div>Acc. Doc. 4.2.1</div> <div>UC-5.2. 1, UC-5.2. 2, UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6, UC-5.2. 8</div> <div>UI-001</div> <div>Verified</div> <div>NFR 2.2.5</div> <div>Access ibility (contra st,</div>
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				layouts) Acc. Doc. 4.2.1, 4.2.2 UC-5.2. 1, UC-5.2. 2, UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6, UC-5.2. 7, UC-5.2. 8 UI-001, ER-001, ER-002, ER-003 Verified
Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.)	Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.)	Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.)	Requireme nt ID (from Req. Doc.) Description Acceptanc e Criteria (from Acc. Doc.)	Require ment ID (from Req. Doc.) Descrip tion

Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Acceptance Criteria (from Acc. Doc.)
Test Cases (This Doc)	Test Cases (This Doc)	Test Cases (This Doc)	Test Cases (This Doc)	Related Use Cases (from Req. Doc.)
Status	Status	Status	Status	Test Cases (This Doc)
FR 2.1.1	FR 2.1.1	FR 2.1.1	FR 2.1.1	Status
Arithmetic Puzzles (Add/Sub)	Arithmetic Puzzles (Add/Sub)	Arithmetic Puzzles (Add/Sub)	Arithmetic Puzzles (Add/Sub)	FR 2.1.1
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UT-001, UT-004, IT-002, ST-001	UT-001, UT-004, IT-002, ST-001	UT-001, UT-004, IT-002, ST-001	UT-001, UT-004, IT-002, ST-001	FR 2.1.1
Verified	Verified	Verified	Verified	Arithmetic Puzzles (Add/Sub)
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Acc. Doc. 3.1.2	Acc. Doc. 3.1.2	Acc. Doc. 3.1.2	Acc. Doc. 3.1.2	UT-001, UT-004, IT-002, ST-001
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Verified	Verified	Verified	Verified	Arithmetic Puzzles (Add/Sub)
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	UC-5.2.5		Verified	

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Level Progression	Acc. Doc. 3.2	Level Progression	UT-003, IT-002, ST-001	Acc. Doc. 3.1.2
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UC-5.2.1, UC-5.2.4, UC-5.2.8	IT-001, ST-001	UC-5.2.1, UC-5.2.4, UC-5.2.8	FR 2.1.4	UT-002, IT-002, ST-001
IT-001, ST-001	Verified	IT-001, ST-001	Level Progressio n	Verified
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FR 2.1.5	Immediate Feedback	FR 2.1.5	UC-5.2.1, UC-5.2.4, UC-5.2.8	Letter- Color Matchi ng Task
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Points Tracking	Acc. Doc. 3.3.1	Points Tracking		
Acc. Doc. 3.3.1	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6			
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UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	Verified	Acc. Doc. 3.3.1	UC-5.2.5, UC-5.2.6, UC-5.2.7	Verified
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Verified	Retry Mechanism (no penalty)	UT-001-UT-004, IT-001, ST-001	Verified	Verified
FR 2.1.8	Acc. Doc. 3.1.1-3.1.4	Verified	FR 2.1.7	FR 2.1.5
Retry Mechanism (no penalty)	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	FR 2.1.8	Task Completion Indication	Immedi ate Feedba ck
Acc. Doc. 3.1.1-3.1.4	UT-001-UT-004	Retry Mechanism (no penalty)	Acc. Doc. 3.1.1-3.1.4, 3.2	Acc. Doc. 3.1.1-3. 1.4, 4.2.1
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Verified	Verified	ST-001		FR 2.1.6
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Verified	UI-001, UI-002	UT-102, ST-001	FR 2.1.9	
NFR 2.2.1	Verified	Verified	Narrative Context	
Usability (intuitive UI)	NFR 2.2.2	NFR 2.2.1	Acc. Doc. 3.2	
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UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Acc. Doc. 4.1.1	Acc. Doc. 4.2.1	ST-001	
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UI-001, UI-002	PT-001		FR 2.1.10	
Verified	Verified	UI-001, UI-002		
NFR 2.2.2	NFR 2.2.3	Verified		

Responsiveness (feedback lag)	Performance (FPS, memory)	NFR 2.2.2	Game Restart/Quit	Indication
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Verified	Verified		Verified	
NFR 2.2.3	NFR 2.2.4	PT-001	NFR 2.2.1	
	Visual Design (cohesive assets)	Verified	Usability (intuitive UI)	
Performance (FPS, memory)	Acc. Doc. 4.2.1	NFR 2.2.3	Acc. Doc. 4.2.1	UT-001- UT-004, IT-001, ST-001
Acc. Doc. 4.1.2	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Performance (FPS, memory)	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Verified
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	UI-001	Acc. Doc. 4.1.2		FR 2.1.8
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Verified	Accessibility (contrast, layouts)	PT-002, ST-002	NFR 2.2.2	Acc. Doc. 3.1.1-3. 1.4
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				Verified

Requirement ID (from Req. Doc.)	Requirement ID (from Req. Doc.)	Requirement ID (from Req. Doc.)	Requirement ID (from Req. Doc.)	Requirement ID (from Req. Doc.)
Description	Description	Description	Description	Description
Acceptance Criteria (from Acc. Doc.)	Acceptance Criteria (from Acc. Doc.)	Acceptance Criteria (from Acc. Doc.)	Acceptance Criteria (from Acc. Doc.)	Description
Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Acceptance Criteria (from Acc. Doc.)
Test Cases (This Doc)	Test Cases (This Doc)	Test Cases (This Doc)	Test Cases (This Doc)	Related Use Cases (from Req. Doc.)
Status	Status	Status	Status	Test Cases (This Doc)
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Verified	Verified	Verified	Verified	Acc. Doc.
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Fruit Sorting Task	Fruit Sorting Task	Fruit Sorting Task	Fruit Sorting Task	
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UI-001		UI-001	PT-001	Narrati ve Contex t
Verified		Verified	Verified	Acc. Doc. 3.2
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				<div>Perfor mance (FPS, memor y)</div> <div>Acc. Doc. 4.1.2</div> <div>UC-5.2. 1, UC-5.2. 2, UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6, UC-5.2. 8</div> <div>PT-002, ST-002</div> <div>Verified</div> <div>NFR 2.2.4</div> <div>Visual Design (cohesi ve assets)</div> <div>Acc. Doc. 4.2.1</div> <div>UC-5.2. 1,</div>
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Acc. Doc. 3.1.1-3.1.4	Narrative Context	Acc. Doc. 3.1.1-3.1.4	FR 2.1.7	UC-5.2. 2, UC-5.2. 3, UC-5.2. 5, UC-5.2. 7
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Verified FR 2.1.9	ST-001	Verified FR 2.1.9	UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6	
Narrative Context	Verified FR 2.1.10	Narrative Context	UT-001-UT- 004, IT-001, ST-001	
Acc. Doc. 3.2	Game Restart/Quit	Acc. Doc. 3.2		
	Acc. Doc. 3.2			
	UC-5.2.8			
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UC-5.2.1, UC-5.2.4	Verified	UC-5.2.1, UC-5.2.4	Verified	Verified
ST-001	NFR 2.2.1	ST-001	FR 2.1.8	FR 2.1.6
Verified	Usability (intuitive UI)	Verified	Retry Mechanism (no penalty)	Points Trackin g
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Acc. Doc. 3.2		Acc. Doc. 3.2	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	UC-5.2. 2, UC-5.2. 3, UC-5.2. 5, UC-5.2. 6
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UT-102, ST-001	Verified	UT-102, ST-001	UT-001-UT- 004	
Verified	NFR 2.2.2	Verified	Verified	
NFR 2.2.1	Responsiveness (feedback lag)	NFR 2.2.1		
Usability (intuitive UI)	Acc. Doc. 4.1.1	Usability (intuitive UI)	FR 2.1.9	UT-101, UT-102, IT-002, ST-001
Acc. Doc. 4.2.1	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	Acc. Doc. 4.2.1	Narrative Context	Verified
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	PT-001	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Acc. Doc. 3.2	FR 2.1.7
UI-001, UI-002	Verified	UI-001, UI-002	UC-5.2.1, UC-5.2.4	Task Compl etion Indicati on
Verified	NFR 2.2.3	Verified	ST-001	
NFR 2.2.2	Performance (FPS, memory)	NFR 2.2.2	Verified	
Responsiveness (feedback lag)	Acc. Doc. 4.1.2	Responsiveness (feedback lag)	FR 2.1.10	
Acc. Doc. 4.1.1	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Acc. Doc. 4.1.1	Game Restart/Qui t	Acc. Doc. 3.1.1-3. 1.4, 3.2
			Acc. Doc. 3.2	UC-5.2. 2,

UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	PT-002, ST-002 Verified NFR 2.2.4 Visual Design (cohesive assets)	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	UC-5.2.8 UT-102, ST-001 Verified NFR 2.2.1	UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6
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Verified		Verified	Verified	
NFR 2.2.5		NFR 2.2.5	NFR 2.2.3	Acc. Doc. 3.2
Accessibility (contrast, layouts)		Accessibility (contrast, layouts)	Performan ce (FPS, memory)	UC-5.2. 1, UC-5.2. 4
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Verified		Verified	Verified	Game Restart /Quit
			NFR 2.2.4	Acc. Doc. 3.2
			Visual Design (cohesive assets)	UC-5.2. 8
			Acc. Doc. 4.2.1	UT-102, ST-001
			UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5,	Verified
				NFR 2.2.1
				Usabilit y

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			UI-001	Acc. Doc.
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			Verified	Verified
				NFR 2.2.2
				Responsiveness (feedback lag)
				Acc. Doc. 4.1.1
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				<div>PT-002, ST-002</div> <div>Verified</div> <div>NFR 2.2.4</div> <div>Visual Design (cohesi ve assets)</div> <div>Acc. Doc. 4.2.1</div> <div>UC-5.2. 1, UC-5.2. 2, UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6, UC-5.2. 8</div> <div>UI-001</div> <div>Verified</div> <div>NFR 2.2.5</div> <div>Access ibility (contra st,</div>
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				layouts) Acc. Doc. 4.2.1, 4.2.2 UC-5.2. 1, UC-5.2. 2, UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6, UC-5.2. 7, UC-5.2. 8 UI-001, ER-001, ER-002, ER-003 Verified
Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.)	Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.)	Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.)	Requireme nt ID (from Req. Doc.) Description Acceptanc e Criteria (from Acc. Doc.)	Require ment ID (from Req. Doc.) Descrip tion

Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Acceptance Criteria (from Acc. Doc.)
Test Cases (This Doc)	Test Cases (This Doc)	Test Cases (This Doc)	Test Cases (This Doc)	Related Use Cases (from Req. Doc.)
Status	Status	Status	Status	Test Cases (This Doc)
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Verified	Verified	Verified	Verified	Arithmetic Puzzles (Add/Sub)
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Verified	Verified	Verified	Verified	Arithmetic Puzzles (Add/Sub)
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Verified	FR 2.1.6	Verified	Acc. Doc. 3.1.1-3.1.4, 4.2.1	
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UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	Verified	Acc. Doc. 3.3.1	UC-5.2.5, UC-5.2.6, UC-5.2.7	Verified
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Verified	Retry Mechanism (no penalty)	UT-001-UT-004, IT-001, ST-001	Verified	Verified
FR 2.1.8	Acc. Doc. 3.1.1-3.1.4	Verified	FR 2.1.7	FR 2.1.5
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Acc. Doc. 3.1.1-3.1.4	UT-001-UT-004	Retry Mechanism (no penalty)	Acc. Doc. 3.1.1-3.1.4, 3.2	Acc. Doc. 3.1.1-3. 1.4, 4.2.1
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Verified	Narrative Context	UT-001-UT-004		
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Verified	Verified	ST-001		FR 2.1.6
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UC-5.2.8	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Acc. Doc. 3.2	UT-001-UT-004	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6
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Verified	UI-001, UI-002	UT-102, ST-001	FR 2.1.9	
NFR 2.2.1	Verified	Verified	Narrative Context	
Usability (intuitive UI)	NFR 2.2.2	NFR 2.2.1	Acc. Doc. 3.2	
Acc. Doc. 4.2.1	Responsiveness (feedback lag)	Usability (intuitive UI)	UC-5.2.1, UC-5.2.4	
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Acc. Doc. 4.1.1	Acc. Doc. 4.2.1	ST-001	
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Verified	Verified	UI-001, UI-002		
NFR 2.2.2	NFR 2.2.3	Verified		

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PT-001	PT-002, ST-002	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	UT-102, ST-001	
Verified	Verified		Verified	
NFR 2.2.3	NFR 2.2.4	PT-001	NFR 2.2.1	
	Visual Design (cohesive assets)	Verified	Usability (intuitive UI)	
Performance (FPS, memory)	Acc. Doc. 4.2.1	NFR 2.2.3	Acc. Doc. 4.2.1	UT-001- UT-004, IT-001, ST-001
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			Visual Design (cohesive assets)	Game Restart /Quit
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Requirement ID (from Req. Doc.)	Requirement ID (from Req. Doc.)	Requirement ID (from Req. Doc.)	Requirement ID (from Req. Doc.)	Requirement ID (from Req. Doc.)
Description	Description	Description	Description	Description
Acceptance Criteria (from Acc. Doc.)	Acceptance Criteria (from Acc. Doc.)	Acceptance Criteria (from Acc. Doc.)	Acceptance Criteria (from Acc. Doc.)	Description
Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Acceptance Criteria (from Acc. Doc.)
Test Cases (This Doc)	Test Cases (This Doc)	Test Cases (This Doc)	Test Cases (This Doc)	Related Use Cases (from Req. Doc.)
Status	Status	Status	Status	Test Cases (This Doc)
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				layouts) Acc. Doc. 4.2.1, 4.2.2 UC-5.2. 1, UC-5.2. 2, UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6, UC-5.2. 7, UC-5.2. 8 UI-001, ER-001, ER-002, ER-003 Verified
Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.)	Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.)	Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.)	Requireme nt ID (from Req. Doc.) Description Acceptanc e Criteria (from Acc. Doc.)	Require ment ID (from Req. Doc.) Descrip tion

Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Acceptance Criteria (from Acc. Doc.)
Test Cases (This Doc)	Test Cases (This Doc)	Test Cases (This Doc)	Test Cases (This Doc)	Related Use Cases (from Req. Doc.)
Status	Status	Status	Status	Test Cases (This Doc)
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Responsiveness (feedback lag)	Performance (FPS, memory)	NFR 2.2.2	Game Restart/Quit	Indication
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Verified	Verified		Verified	
NFR 2.2.3	NFR 2.2.4	PT-001	NFR 2.2.1	
	Visual Design (cohesive assets)	Verified	Usability (intuitive UI)	
Performance (FPS, memory)	Acc. Doc. 4.2.1	NFR 2.2.3	Acc. Doc. 4.2.1	UT-001- UT-004, IT-001, ST-001
Acc. Doc. 4.1.2	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Performance (FPS, memory)	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Verified
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	UI-001	Acc. Doc. 4.1.2		FR 2.1.8
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Visual Design (cohesive assets)	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	NFR 2.2.4	Acc. Doc. 4.1.1	
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			UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	UT-102, ST-001 Verified NFR 2.2.1
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				Verified

Requirement ID (from Req. Doc.)	Requirement ID (from Req. Doc.)	Requirement ID (from Req. Doc.)	Requirement ID (from Req. Doc.)	Requirement ID (from Req. Doc.)
Description	Description	Description	Description	Description
Acceptance Criteria (from Acc. Doc.)	Acceptance Criteria (from Acc. Doc.)	Acceptance Criteria (from Acc. Doc.)	Acceptance Criteria (from Acc. Doc.)	Description
Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Related Use Cases (from Req. Doc.)	Acceptance Criteria (from Acc. Doc.)
Test Cases (This Doc)	Test Cases (This Doc)	Test Cases (This Doc)	Test Cases (This Doc)	Related Use Cases (from Req. Doc.)
Status	Status	Status	Status	Test Cases (This Doc)
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NFR 2.2.2	Performance (FPS, memory)	NFR 2.2.2	Verified	
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PT-001	Verified	PT-001	UC-5.2.8	
Verified	NFR 2.2.4	Verified	UT-102, ST-001	
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Verified		Verified	NFR 2.2.2	3.1.1-3. 1.4
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Verified		Verified	Verified	Acc. Doc. 3.2
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Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc) Status	Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc) Status FR 2.1.1	Requirement ID (from Req. Doc.) Description Acceptance Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc) Status	Requireme nt ID (from Req. Doc.) Description Acceptanc e Criteria (from Acc. Doc.) Related Use Cases (from Req. Doc.) Test Cases (This Doc)	Require ment ID (from Req. Doc.) Descrip tion Accept ance Criteria (from Acc. Doc.) Related Use

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UC-5.2.5	UT-003, IT-002, ST-001	UC-5.2.5	Letter-Color Matching Task	
UT-003, IT-002, ST-001	Verified	UT-003, IT-002, ST-001		
Verified	FR 2.1.4	Verified		
FR 2.1.4	Level Progression	FR 2.1.4		
	Acc. Doc. 3.2			

Level Progression	UC-5.2.1, UC-5.2.4, UC-5.2.8	Level Progression	Acc. Doc. 3.1.3	Fruit Sorting Task
Acc. Doc. 3.2	IT-001, ST-001	Acc. Doc. 3.2	UC-5.2.5	Acc. Doc. 3.1.2
UC-5.2.1, UC-5.2.4, UC-5.2.8	Verified	UC-5.2.1, UC-5.2.4, UC-5.2.8	UT-003, IT-002, ST-001	UC-5.2.3
IT-001, ST-001	FR 2.1.5	IT-001, ST-001	Verified	UT-002, IT-002, ST-001
Verified	Immediate Feedback	Verified	FR 2.1.4	Verified
FR 2.1.5	Acc. Doc. 3.1.1-3.1.4, 4.2.1	FR 2.1.5	Level Progression	FR 2.1.3
Immediate Feedback	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6, UC-5.2.7	Immediate Feedback	Acc. Doc. 3.2	Letter-Color Matching Task
Acc. Doc. 3.1.1-3.1.4, 4.2.1	IT-A01, IT-A02, UI-002	Acc. Doc. 3.1.1-3.1.4, 4.2.1	UC-5.2.1, UC-5.2.4, UC-5.2.8	Acc. Doc. 3.1.3
UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6, UC-5.2.7	Verified	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6, UC-5.2.7	IT-001, ST-001	UC-5.2.5
IT-A01, IT-A02, UI-002	FR 2.1.6	IT-A01, IT-A02, UI-002	Verified	UT-003, IT-002, ST-001
Verified	Points Tracking	Verified	FR 2.1.5	Verified
FR 2.1.6	Acc. Doc. 3.3.1	FR 2.1.6	Immediate Feedback	FR 2.1.4
Points Tracking	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	Points Tracking	Acc. Doc. 3.1.1-3.1.4, 4.2.1	Level Progression
Acc. Doc. 3.3.1	UT-101, UT-102, IT-002, ST-001	Acc. Doc. 3.3.1	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6, UC-5.2.7	
UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	Verified	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6		
UT-101, UT-102, IT-002, ST-001	FR 2.1.7	UT-101, UT-102, IT-002, ST-001		
	Task Completion Indication			
	Acc. Doc. 3.1.1-3.1.4, 3.2			

Verified FR 2.1.7	UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6	Verified FR 2.1.7	IT-A01, IT-A02, UI-002	Acc. Doc. 3.2
Task Completion Indication	UT-001-UT-004, IT-001, ST-001	Task Completion Indication	Verified FR 2.1.6	UC-5.2. 1, UC-5.2. 4, UC-5.2. 8
Acc. Doc. 3.1.1-3.1.4, 3.2	Verified FR 2.1.8	Acc. Doc. 3.1.1-3.1.4, 3.2	Points Tracking	IT-001, ST-001
UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6	Retry Mechanism (no penalty)	UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6	Acc. Doc. 3.3.1	Verified
UT-001-UT-004, IT-001, ST-001	Acc. Doc. 3.1.1-3.1.4	UT-001-UT-004, IT-001, ST-001	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	FR 2.1.5
Verified FR 2.1.8	UT-001-UT-004	Verified FR 2.1.8	UT-101, UT-102, IT-002, ST-001	Immedi ate Feedba ck
Retry Mechanism (no penalty)	Verified FR 2.1.9	Retry Mechanism (no penalty)	Verified	Acc. Doc. 3.1.1-3. 1.4, 4.2.1
Acc. Doc. 3.1.1-3.1.4	Narrative Context	Acc. Doc. 3.1.1-3.1.4	FR 2.1.7	UC-5.2. 2, UC-5.2. 3, UC-5.2. 5, UC-5.2. 7
UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	Acc. Doc. 3.2	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	Task Completion Indication	IT-A01, IT-A02, UI-002
UT-001-UT-004	UC-5.2.1, UC-5.2.4	UT-001-UT-004	Acc. Doc. 3.1.1-3.1.4, 3.2	
Verified FR 2.1.9	ST-001	Verified FR 2.1.9	UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6	
Narrative Context	Verified FR 2.1.10	Narrative Context	UT-001-UT- 004, IT-001, ST-001	
Acc. Doc. 3.2	Game Restart/Quit	Acc. Doc. 3.2		
	Acc. Doc. 3.2			
	UC-5.2.8			
	UT-102, ST-001			

UC-5.2.1, UC-5.2.4	Verified	UC-5.2.1, UC-5.2.4	Verified	Verified
ST-001	NFR 2.2.1	ST-001	FR 2.1.8	FR 2.1.6
Verified	Usability (intuitive UI)	Verified	Retry Mechanism (no penalty)	Points Tracking
FR 2.1.10	Acc. Doc. 4.2.1	FR 2.1.10		
Game Restart/Quit	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Game Restart/Quit	Acc. Doc. 3.1.1-3.1.4	Acc. Doc. 3.3.1
Acc. Doc. 3.2		Acc. Doc. 3.2	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6	UC-5.2.2, UC-5.2.3, UC-5.2.5, UC-5.2.6
UC-5.2.8	UI-001, UI-002	UC-5.2.8		
UT-102, ST-001	Verified	UT-102, ST-001	UT-001-UT-004	
Verified	NFR 2.2.2	Verified	Verified	
NFR 2.2.1	Responsiveness (feedback lag)	NFR 2.2.1		
Usability (intuitive UI)	Acc. Doc. 4.1.1	Usability (intuitive UI)	FR 2.1.9	UT-101, UT-102, IT-002, ST-001
Acc. Doc. 4.2.1	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	Acc. Doc. 4.2.1	Narrative Context	Verified
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	PT-001	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Acc. Doc. 3.2	
	Verified		UC-5.2.1, UC-5.2.4	FR 2.1.7
UI-001, UI-002	NFR 2.2.3	UI-001, UI-002	ST-001	Task Completion Indication
Verified	Performance (FPS, memory)	Verified	Verified	
NFR 2.2.2	Acc. Doc. 4.1.2	NFR 2.2.2	FR 2.1.10	
Responsiveness (feedback lag)	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Responsiveness (feedback lag)	Game Restart/Quit	Acc. Doc. 3.1.1-3.1.4, 3.2
Acc. Doc. 4.1.1		Acc. Doc. 4.1.1	Acc. Doc. 3.2	UC-5.2.2,

UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	PT-002, ST-002 Verified NFR 2.2.4 Visual Design (cohesive assets)	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	UC-5.2.8 UT-102, ST-001 Verified NFR 2.2.1	UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6
PT-001 Verified NFR 2.2.3 Performance (FPS, memory) Acc. Doc. 4.1.2	Acc. Doc. 4.2.1 UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8 UI-001 Verified NFR 2.2.5	PT-001 Verified NFR 2.2.3 Performance (FPS, memory) Acc. Doc. 4.1.2	Usability (intuitive UI) Acc. Doc. 4.2.1 UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8 UI-001, UI-002 Verified NFR 2.2.2	UT-001- UT-004, IT-001, ST-001 Verified FR 2.1.8 Retry Mecha nism (no penalty) Acc. Doc. 3.1.1-3. 1.4
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Accessability (contrast, layouts) Acc. Doc. 4.2.1, 4.2.2	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	UI-001, UI-002 Verified NFR 2.2.2	UC-5.2. 2, UC-5.2. 3, UC-5.2. 5, UC-5.2. 6
PT-002, ST-002 Verified NFR 2.2.4 Visual Design (cohesive assets) Acc. Doc. 4.2.1	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8 UI-001, ER-001, ER-002, ER-003 Verified	PT-002, ST-002 Verified NFR 2.2.4 Visual Design (cohesive assets) Acc. Doc. 4.2.1	Responsiveness (feedback lag) Acc. Doc. 4.1.1 UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6,	UT-001- UT-004 Verified
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5,		UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5,	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6,	

UC-5.2.6, UC-5.2.8		UC-5.2.6, UC-5.2.8	UC-5.2.7, UC-5.2.8	FR 2.1.9
UI-001		UI-001	PT-001	Narrati ve Contex t
Verified		Verified	Verified	
NFR 2.2.5		NFR 2.2.5	NFR 2.2.3	Acc. Doc. 3.2
Accessibility (contrast, layouts)		Accessibility (contrast, layouts)	Performan ce (FPS, memory)	UC-5.2. 1, UC-5.2. 4
Acc. Doc. 4.2.1, 4.2.2		Acc. Doc. 4.2.1, 4.2.2	Acc. Doc. 4.1.2	ST-001
UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8		UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.8	Verified
UI-001, ER-001, ER-002, ER-003		UI-001, ER-001, ER-002, ER-003	PT-002, ST-002	FR 2.1.10
Verified		Verified	Verified	Game Restart /Quit
			NFR 2.2.4	Acc. Doc. 3.2
			Visual Design (cohesive assets)	UC-5.2. 8
			Acc. Doc. 4.2.1	UT-102, ST-001
			UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5,	Verified
				NFR 2.2.1
				Usabilit y

			UC-5.2.6, UC-5.2.8	(intuitive UI)
			UI-001	Acc. Doc.
			Verified	4.2.1
			NFR 2.2.5	UC-5.2. 1,
			Accessibility (contrast, layouts)	UC-5.2. 2,
			Acc. Doc. 4.2.1, 4.2.2	UC-5.2. 3,
			UC-5.2.1, UC-5.2.2, UC-5.2.3, UC-5.2.4, UC-5.2.5, UC-5.2.6, UC-5.2.7, UC-5.2.8	UC-5.2. 4, UC-5.2. 5, UC-5.2. 6, UC-5.2. 8
			UI-001, ER-001, ER-002, ER-003	UI-001, UI-002
			Verified	Verified
				NFR 2.2.2
				Responsiveness (feedback lag)
				Acc. Doc. 4.1.1
				UC-5.2. 1, UC-5.2. 2, UC-5.2.

				<div>3, UC-5.2.</div> <div>4, UC-5.2.</div> <div>5, UC-5.2.</div> <div>6, UC-5.2.</div> <div>7, UC-5.2.</div> <div>8</div> <div>PT-001</div> <div>Verified</div> <div>NFR 2.2.3</div> <div>Perfor mance (FPS, memor y)</div> <div>Acc. Doc. 4.1.2</div> <div>UC-5.2. 1, UC-5.2. 2, UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6, UC-5.2. 8</div>
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				<div>PT-002, ST-002</div> <div>Verified</div> <div>NFR 2.2.4</div> <div>Visual Design (cohesi ve assets)</div> <div>Acc. Doc. 4.2.1</div> <div>UC-5.2. 1, UC-5.2. 2, UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6, UC-5.2. 8</div> <div>UI-001</div> <div>Verified</div> <div>NFR 2.2.5</div> <div>Access ibility (contra st,</div>
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				layouts) Acc. Doc. 4.2.1, 4.2.2 UC-5.2. 1, UC-5.2. 2, UC-5.2. 3, UC-5.2. 4, UC-5.2. 5, UC-5.2. 6, UC-5.2. 7, UC-5.2. 8 UI-001, ER-001, ER-002, ER-003 Verified
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7.0 TEST ENVIRONMENT SETUP

7.1 Environment Configuration

- **Hardware Requirements:**
 - Minimum: 4GB RAM, 2GHz dual-core processor, 80MB storage.
 - Recommended: 8GB RAM, 3GHz quad-core processor, 200MB storage.
- **Graphics:** DirectX 11 compatible graphics card.
- **Software Setup:**
 - Godot Engine 4.x (exact version matching development: Godot 4.1.1 Stable).

- Clean OS installation (Windows 10, macOS 10.15+, Ubuntu 18.04+) for baseline testing.
- No additional third-party software that might interfere with game execution.
- Godot Debugger and console configured for logging and profiling during test runs.

7.2 Test Data Management

- **Test Assets:**

- Standard game assets (PNGs for characters, fruits, UI; MP3s for audio) as included in the assets/ folder.
- Sample puzzle configurations for various difficulty levels (for example, pre-defined addition/subtraction problems if not random).
- Test save files for different game states (N/A for this project as there is no persistent save/load).
- Performance test scenarios (for example, repeatedly loading scenes, rapid interaction sequences).
- Error condition simulation data (for example, intentionally corrupted or missing files for error handling tests).

- **Data Reset Procedures:**

- Clean game installation process for each major test cycle (delete extracted folder, re-extract).
- `GameManager.reset_game_state()` used programmatically for resetting in-session progress during test runs.
- System cache clearing procedures where applicable (for example, browser cache for web exports, although not primary target).
- Test data backup and restoration protocols (Git repository serves as primary backup for source code and assets).

8.0 APPENDICES

8.1 Appendix A: Test Case Details (Expanded)

This appendix would contain further detailed breakdowns for each test case, including:

- Pre-requisite setup steps for complex tests.
- Specific data inputs (for example, for arithmetic tasks, exact numbers used).
- Screenshots or expected visual outcomes for UI tests.
- Detailed console log expected outputs for error handling tests.

- Pass/Fail criteria for sub-steps within complex test cases.

8.2 Appendix B: Testing Scripts and Automation

This appendix would include:

- Any custom GDScript snippets written specifically for testing individual functions or components (for example, a temporary script to call `GameManager.award_points` directly).
- Instructions for setting up a minimal Godot project to run specific unit tests if applicable.
- Details on how to use Godot's built-in debugger for profiling and monitoring performance.

8.3 Appendix C: Performance Baseline Data

This appendix would contain the collected performance metrics (FPS, memory, CPU) from the final test runs, potentially including:

- Charts showing FPS over time during gameplay.
- Peak and average memory usage for each scene.
- CPU utilization graphs during intense interactions.
- Comparison data against performance criteria.

8.4 Appendix D: Test Environment Setup Guide

This appendix would provide step-by-step instructions for configuring a testing machine to replicate the development environment, including:

- Godot Engine installation steps.
- Required OS versions and dependencies.
- Instructions for cloning the Git repository and setting up the project.
- Any necessary system configurations or troubleshooting tips for common environment issues.