# Mapping Test Cases to the Test Pyramid

This document categorizes the test cases into appropriate layers of the Test Pyramid, which consists of Unit Tests, Integration Tests, and End-to-End (E2E) Tests. Each layer ensures different aspects of system functionality are tested efficiently.

## Test Pyramid Layers

1. \*\*Unit Tests (Bottom Layer – Foundation, Fast & Automated)\*\*  
 - Tests individual components in isolation.  
 - Typically automated and run frequently.  
 - Example: Validation checks, business logic verification.  
  
2. \*\*Integration Tests (Middle Layer – Service & API Interactions)\*\*  
 - Verifies interactions between different components or services.  
 - Ensures data flow and integration correctness.  
 - Example: API responses, database interactions, third-party services.  
  
3. \*\*End-to-End (E2E) Tests (Top Layer – Full UI & User Journey)\*\*  
 - Covers complete workflows from start to finish.  
 - Simulates real-world user scenarios across multiple components.  
 - Example: Full registration-to-purchase flows.

## Test Case Distribution in the Test Pyramid

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| Test Case | Test Pyramid Layer | Reasoning |
| User Registration with Valid Credentials | End-to-End (E2E) | Covers UI flow, email verification. |
| User Registration with Invalid Credentials | Unit Test & E2E | UI validation (E2E) & backend validation (Unit). |
| User Login with Valid Credentials | End-to-End (E2E) | Complete login workflow via UI. |
| User Login with Incorrect Credentials | Unit Test & E2E | Error handling (E2E), credential validation (Unit). |
| Profile Update | End-to-End (E2E) | Ensures UI updates user details correctly. |
| Browse Products by Category | End-to-End (E2E) | Tests UI-based browsing navigation. |
| Search for a Product | Integration & E2E | Backend search logic (Integration), UI search (E2E). |
| View Product Details | Integration & E2E | Ensures correct product details retrieval (API + UI). |
| View Personalized Recommendations | Integration | Backend recommendation engine validation. |
| Add Product to Wishlist | End-to-End (E2E) | Covers UI interaction & backend sync. |
| Order Summary Calculation (Implicit) | Unit Test | Backend order calculation validation. |
| Payment Gateway Processing (Implicit) | Integration | Third-party payment API validation. |
| User Authentication Handling (Implicit) | Integration | Ensures authentication logic works (API-based). |