Testing plays a crucial role in ensuring the functionality and quality of the "Plan Your Dish" web application.

Unit Testing will be applied to individual components of the app, such as the calculation of grocery quantities based on selected meals. For example, I will create unit tests to validate that the ingredient quantities are correctly calculated when different serving sizes are selected. These tests will also handle edge cases like missing or incorrect input data, ensuring the app doesn't crash or return inaccurate results. Tools such as Jest will be used to automate these tests for the calculation and validation functions.

Integration Testing will be used to ensure that different parts of the app, like the front-end UI and back-end systems, work together as intended. For instance, when a user selects a meal, the front-end must send this data to the back-end for processing. I will use Postman or Supertest to test the communication between the front-end and back-end, ensuring that meal preferences, shopping history, and other data are correctly stored in and retrieved from the database.

End-to-End (E2E) Testing will simulate real user interactions with the app to validate complete workflows. I will test the user journey from logging in, selecting meals, and generating a grocery list, through to finalizing the shopping list. Tools like Cypress will be used to automate E2E tests, ensuring that the app works across different devices and browsers.

Additionally, **Capture Data Testing** will be applied by logging and analyzing real user data during testing. This will help identify issues in how the app processes information, such as data formatting issues or errors in grocery list generation. I will implement custom logging during tests to capture and track real-time data flow through the system.

Finally, **Regression Testing** will be used after adding new features or fixing bugs. Whenever a new feature, such as a recipe filter or meal suggestion, is introduced, I will rerun the full suite of tests to ensure the new functionality doesn't interfere with existing features. Selenium or Jest will be used to automate regression tests and quickly verify the stability of the app after changes.

By applying these testing techniques, I will ensure that "Plan Your Dish" is robust, reliable, user-friendly, and free of bugs, providing users with a smooth and seamless experience.