Summary of Test Plan Discussion with Colleagues:
+ Gargi
    - Make sure your landing page describes the game, so that people can understand what the product is about before trying it out.
    - Incentivise users to sign up on the landing page as well, rather than only giving options to play with no account or play as a user.
    - Having navbar options separately also available on the user dashboard may be a little confusing to users; consider one universal navbar across the site.
+ Areebah:
    - Prevent an admin user for deleting other admin accounts
    - It might be helpful to put a range on the numbers, so that users don't put extremely huge or small values

Testing Instructions for Expert Users:
+ *Setup:*
    - Frontend:
        - cd dev/frontend
        - npm i
        - npm run start
        - Interact with the frontend via localhost:3000
    - Docker setup:
        - cd dev
        - docker compose build
        - docker compose up -d
    - Backend:
        - cd dev/backend
        - pip3 install Flask flask_cors flask_sqlalchemy jsonify
        - Interact with the backend via localhost:4000

+ *Requirements for hardware/software/password key:*
    - Hardware: computer/laptop, keyboard, mouse/trackpad
    - Software: command line interface (in order to use git, npm, and docker commands)

Automation (Complexity) of Testing Instructions:
+ *Time and effort to set up the test plan for execution:*
    - Download/setup time for all requirements/testing tools: 20 min (max)
    - Testing time for test cases: ~ 1 hr
    - Testing time for backend: TBD

+ *Testing tools:*
    - Frontend: PyTest + Selenium
    - Backend: Postman

Amount of Time to Finish the Tests:
Refer to the 'Expected Time' column in **Test Cases**; however, keep in mind all these times are estimated and the exact duration cannot be properly determined until features are complete.

Test Cases:

Feature	Description	Test Case(s)	Expected Time (max)	Expected Result	Actual Test Result
Landing page	http://localhost:3000/ When users land on the site, they'll be greeted by the home screen. There is a login link to sign in to an account. Users will have the option to 'Play as User' or 'Play as Guest'. Users will be able to view the user leaderboard.	User scrolls from top to bottom.	< 1 min	User should be able to scroll and see the login link at the top, the 'Play as User' and 'Play as Guest' options, and the user leaderboard. All buttons should redirect to the correct pages.	Pass/Fail
		User clicks on the login link.	< 1 min	User is redirected to the Login page.	Pass/Fail
		User clicks on the 'Play as User option.	< 1 min	User is redirected to the Login page.	Pass/Fail
		User clicks on the 'Play as Guest' option.	< 1 min	User is redirected to the Game page as a 'Guest' user.	Pass/Fail
User leaderboard	The User Leaderboard is visible on the landing page. Users can view the current rankings of all the users who have an account on the site based on the points each user has accumulated.	User views the User Leaderboard on the landing page.	< 1 min	User rankings match the sorting of the user data from the database. Everytime a user gains more points and overtakes another user, the leaderboard is updated to reflect the new rankings.	Pass/Fail
Account creation	http://localhost:3000/signup Users can create an account on the Signup page by inputting a valid username, email, and password.	User leaves one of the form fields blank.	< 1 min	The form doesn't submit. User is prompted to fill out the fields they left incomplete.	Pass/Fail
		User tries to create an account with an already existing username.	1 min	The form doesn't submit. User is alerted that the entered username is associated with another account.	Pass/Fail
		User tries to create an account with an	1 min	The form doesn't submit. User is alerted that the	Pass/Fail

		already existing email.		entered email is associated with another account.	
		User tries to create an account with a password that doesn't meet password requirements	1 min	The form doesn't submit. User is alerted to create a password that meets the requirements.	Pass/Fail
		User tries to create an account when both password fields don't match.	1 min	The form doesn't submit. User is alerted that both password fields must match.	Pass/Fail
		User tries to create an account with a valid username, email, and password.	1 min	The form submits. User is redirected to the login page.	Pass/Fail
Password hashing	When an account is being created, users' passwords will be hashed before it's stored in the database for security purposes.	Use Postman to test the 'create_user' route with a body that contains a test username, email, and password.	1 min	The password shouldn't be visible in plaintext in the database or in the API call	Pass/Fail
Login	http://localhost:3000/login Users can login to a pre-existing account on the Login page after providing the correct credentials associated with said account. There is a 'Forgot Password?' link if users don't remember their password.	User enters an incorrect username.	1 min	User is alerted that they entered an incorrect username.	Pass/Fail
		User enters an incorrect password.	1 min	User is alerted that they entered an incorrect password.	Pass/Fail
		User enters the correct username and password.	1 min	User is redirected to the User Dashboard.	Pass/Fail
		User enters the correct username and password and password for an admin account.	1 min	User is redirected to the Admin Dashboard.	Pass/Fail
		User does not remember their password and clicks on the 'Forgot Password?' link.	1 min	User is redirected to the Forgot Password page.	Pass/Fail

User Authentication	The user's identity will be verified after they login on the Login page and before they can access certain pages on the site. If authentication fails, the user will be asked to enter their credentials again.	User enters the incorrect credentials on the Login page.	1 min	User is alerted they entered incorrect credentials. They will not be able to go to the User/Admin Dashboard.	Pass/Fail
		User enters the correct credentials on the Login page.	1 min	User is redirected to the User/Admin Dashboard.	Pass/Fail
Forgot password	http://localhost:3000/forgot-password On the Login page, if users don't remember their password, they can click on the 'Forgot Password?' link and get redirected to the Forgot Password page, where they can provide their email address. An email will then be sent to the user instructing them on how to reset their password.	User enters an incorrect email.	1 min	User is alerted that they entered an incorrect email.	Pass/Fail
		User enters a correct email.	2 min	User is alerted that an email has been sent to them with further instructions.	Pass/Fail
Reset password	http://localhost:3000/reset-password Users will get an email after completing the Forgot Password page, which contains a link that will redirect them to a Reset Password page where they can enter a new password.	User enters a password that doesn't match password requirements.	1 min	The form doesn't submit. User is alerted to create a password that meets the requirements.	Pass/Fail
		User tries to reset their password when both password fields don't match.	1 min	The form doesn't submit. User is alerted that both password fields must match.	Pass/Fail
		User enters a valid password.	1 min	The form submits. User alerted that the password was reset successfully and is redirected to the login page.	Pass/Fail
Logout	Users can logout of their account using the 'Log Out' button in the navbar or in the User Dashboard.	User clicks the 'Log Out' button in the navbar or in the User Dashboard.	< 1 min	User is redirected to the landing page. Their session ends, and they cannot access the User/Admin Dashboard without logging in again.	Pass/Fail
Game	http://localhost.com/3000/game	User clicks on each node and enters a	~10 min	User is notified whether their solution is correct	Pass/Fail

	Users can choose from many possible puzzles. Each puzzle is a diagram of interconnected nodes. User has to type in positive whole numbers in each node such that each node's number is the sum of the digits of all the numbers connected to it	number. After all nodes have been filled, user clicks 'Submit Solution' button to check whether their answer is correct.		and incorrect. If correct, user sees the game end screen. If incorrect, user is prompted to go back to their answers and fix it.	
Get hints	While playing a puzzle, users can click the 'Get Hint' option if they are stuck.	User clicks on the 'Get Hint' option.	< 1 min	User gets a popup that suggests a number they can use to fill in a particular node.	Pass/Fail
Get solution	While playing a puzzle, users can click the 'Get Solution' option if they are stuck	User clicks on the 'Get Solution' option.	< 1 min	User gets one of the possible solutions for the puzzle.	Pass/Fail
Game end screen	After users complete a level, they will see a screen displaying the points they have earned on the level, as well as options to either continue to the next puzzle or to go to the User/Admin dashboard.	User completes a puzzle and sees the total number of points.	< 1 min	All the points have been added up correctly.	Pass/Fail
		User clicks on the 'Proceed to Next Level' option.	< 1 min	User is redirected to the next puzzle.	Pass/Fail
		User clicks on the 'Return to Dashboard' option while logged in.	< 1 min	User is redirected to the User/Admin Dashboard.	Pass/Fail
		User clicks on the 'Return to Dashboard' option while not logged in.	< 1 min	User is redirected to the Login page.	Pass/Fail
User dashboard	http://localhost:3000/user-dashboard Users have a dashboard where they can view their account settings, game history, and a display of their total points.	User scrolls through the User Dashboard and views the button to the Account Settings, game history, and total points.	1 min	User sees the button to the Account Settings, their game history, and total points.	Pass/Fail
User game history	Users can view their game history as well as statistics	User plays a new puzzle, goes to the	Time to play a	User sees all of their previously played games,	Pass/Fail

		about their games played.	User Dashboard, and goes to the Game History section.	game + < 1 min	as well as the new game.	
User total points display	At the top of their User Dashboard, users can view their total points earned from all the games they have played.	User plays a new game and earns more points, goes to the user Dashboard, and goes to the Total Points section.	Time to play a game + < 1 min	User sees the total points have been updated to include the newly completed game.	Pass/Fail	
Admin dashboard	http://localhost:3000/admin-dashboard Admins have a dashboard where they can view their admin features such as user account removal and password reset, as well as statistics from the overall recorded data.	Admin scrolls through the Admin Dashboard and views the button to the Account Settings, the User Account Removal feature, the Password Reset feature, and statistics generated from the data.	< 1 min	Admin sees the button to the Account Settings, the User Account Removal feature, the Password Reset feature, and statistics generated from the data.	Pass/Fail	
Admin user account removal	Admins have the ability to permanently delete user accounts on the Admin Dashboard.	Admin scrolls through the user list and select the user they want to delete.	1 min	Admin will be alerted that they are trying to delete an account and that the action will be permanent. Once the admin confirms the decision, the user's account will be deleted, along will all the data that is associated with their account. User gets an email that informs them that their account has been deleted.	Pass/Fail	
Admin password reset	Admins have the ability to reset the password of a user account on the Admin Dashboard.	Admin enters the username of the account they want to change the password for, along with the new valid password.	1 min	Admin gets a confirmation that the user account information was updated. User gets an email that informs them that their account information has been updated.	Pass/Fail	
Account settings	http://localhost:3000/account-settings Users can access the Account Settings through the User/Admin Dashboard,	User clicks the 'Edit Username' option.	1 min	If user enters a valid username, their account information will be updated with the new username.	Pass/Fail	

	where they can change their username, email, and/or password. User can also delete their account.	User clicks the 'Edit Email' option.	1 min	If user enters a valid email, their account information will be updated with the new email.	Pass/Fail
		User clicks the 'Edit Password' option.	1 min	User is redirected to the Reset Password page. If user enters a valid password, their account information will be updated with the new password;	Pass/Fail
		User clicks the 'Delete Account' option.	1 min	User will be alerted that they are trying to delete their account and that the action will be permanent. Once the user confirms the decision, their account will be deleted, along will all the data that is associated with their account. User will be redirected to the landing page.	Pass/Fail
User data display	On the User/Admin dashboard, users/admins will be able to see statistics and graphs generated from the data collected from users and their gameplays.	User plays a new game and earns more points, goes to the user Dashboard to see the user data.	Time to play a game + 1 min	User sees the user data has been updated to include the newly completed game.	Pass/Fail