

Criterion B

Wireframes:

Home page

Select your topics:

Kinematics	Forces and momentum
Work, energy, power	Rotational mechanics
Thermal energy transfers	Ideal gas model
Greenhouse effect	Thermal dynamics

Better Physics

Start

Preferred length

Drop down:

- 30 mins
- 1h
- 1h 30 mins

Starts the quiz

Question page

Question:

Timer

A

B

C

D

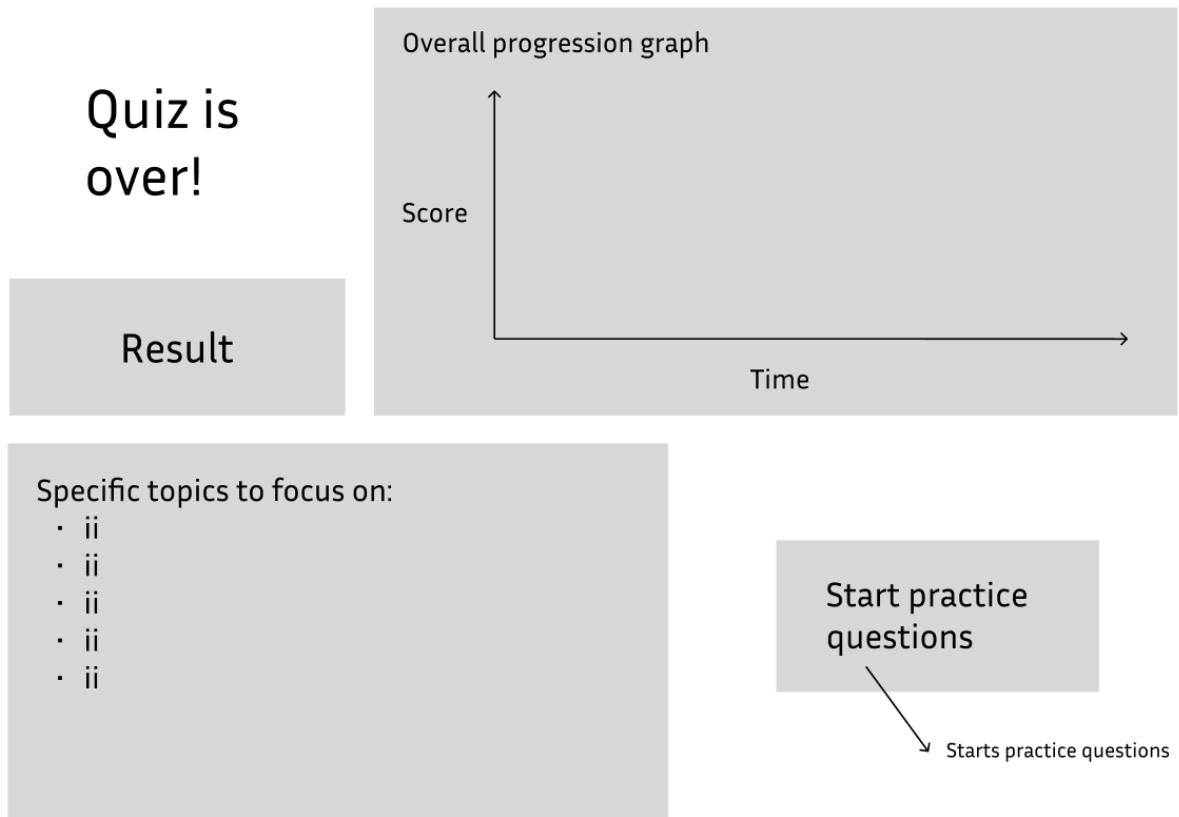
Next question

Terminate

Next

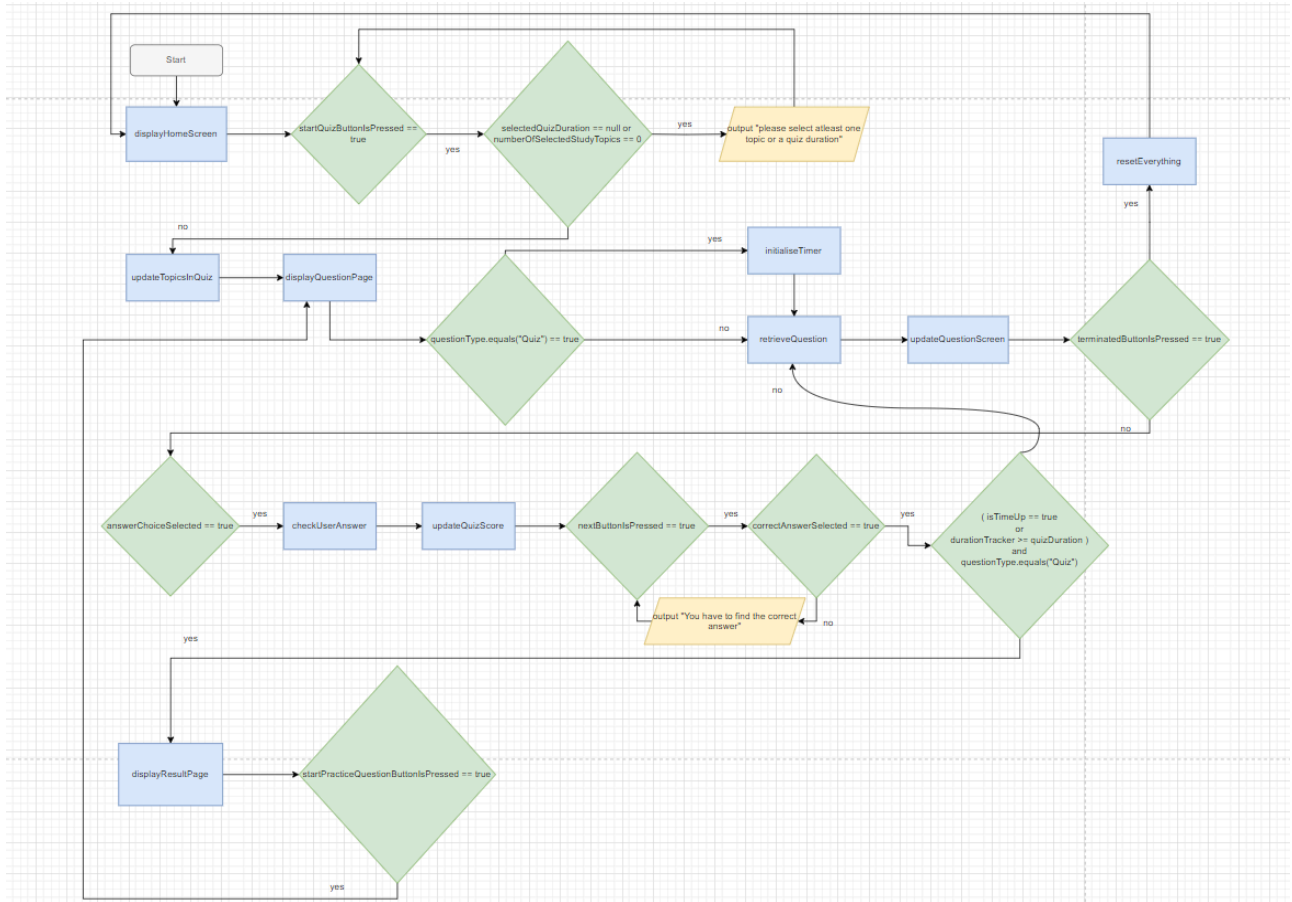
Goes back to starting screen if button is pressed during quiz or practice questions

Result page

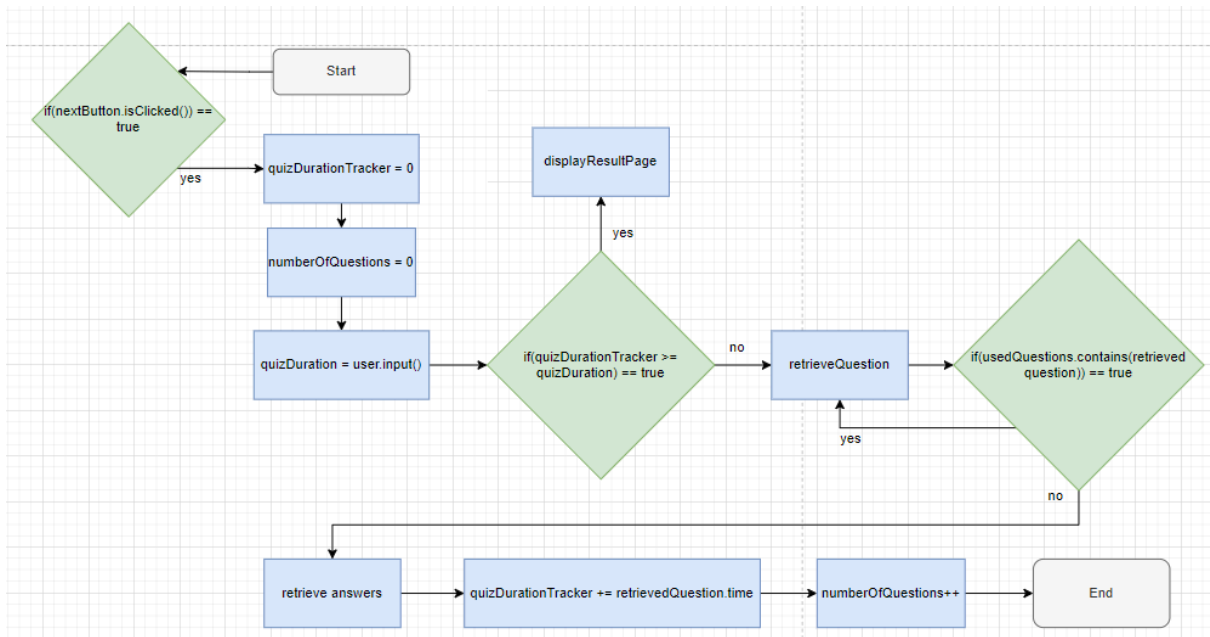


User-flow diagram:

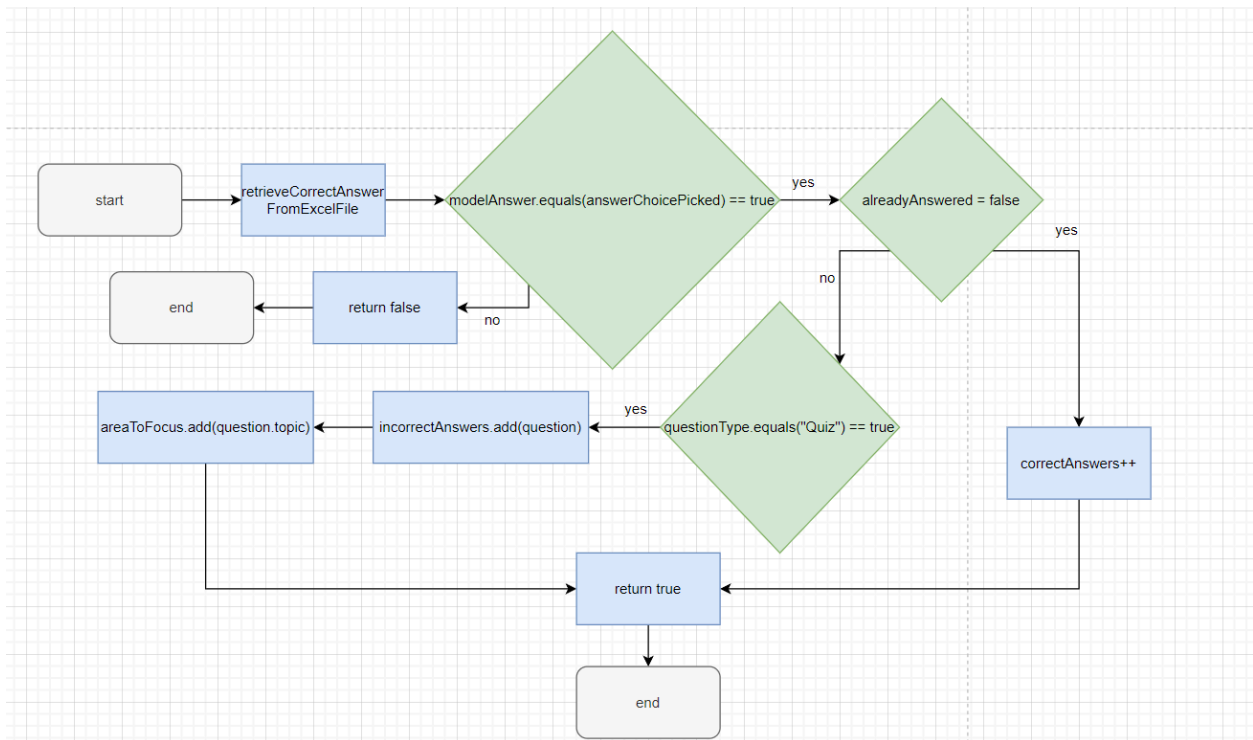
Main user flowchart:



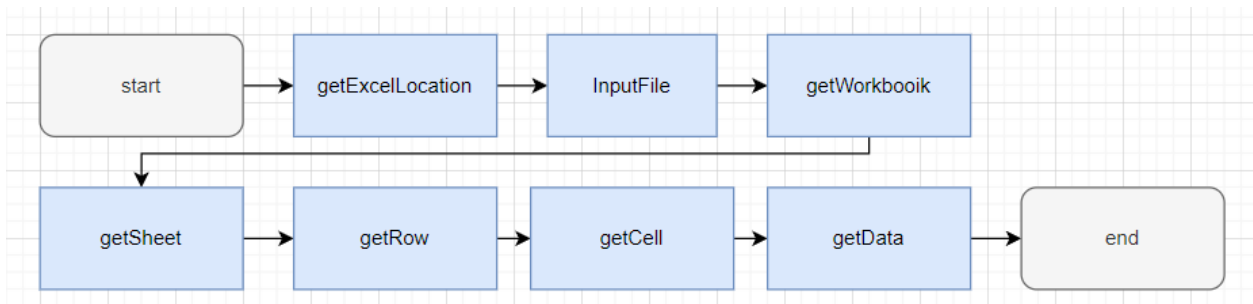
generateQuestion method: How the program generate question



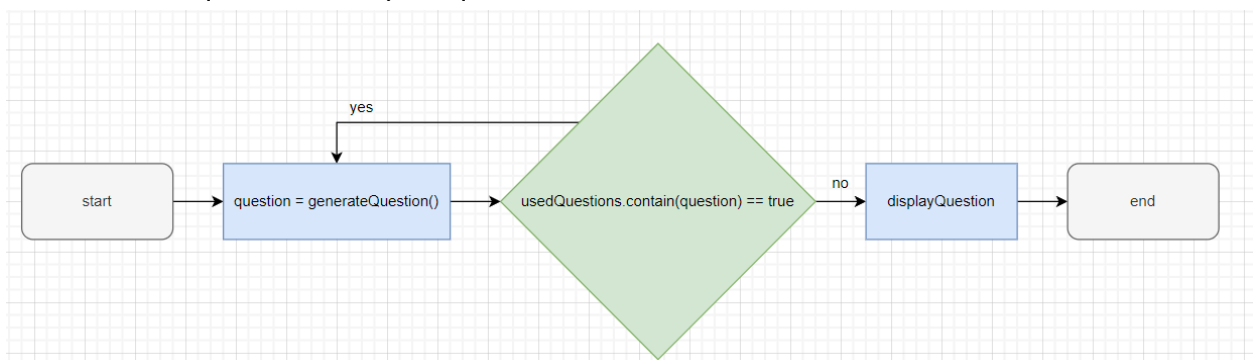
checkUserAnswer method: How the program checks the user's answer



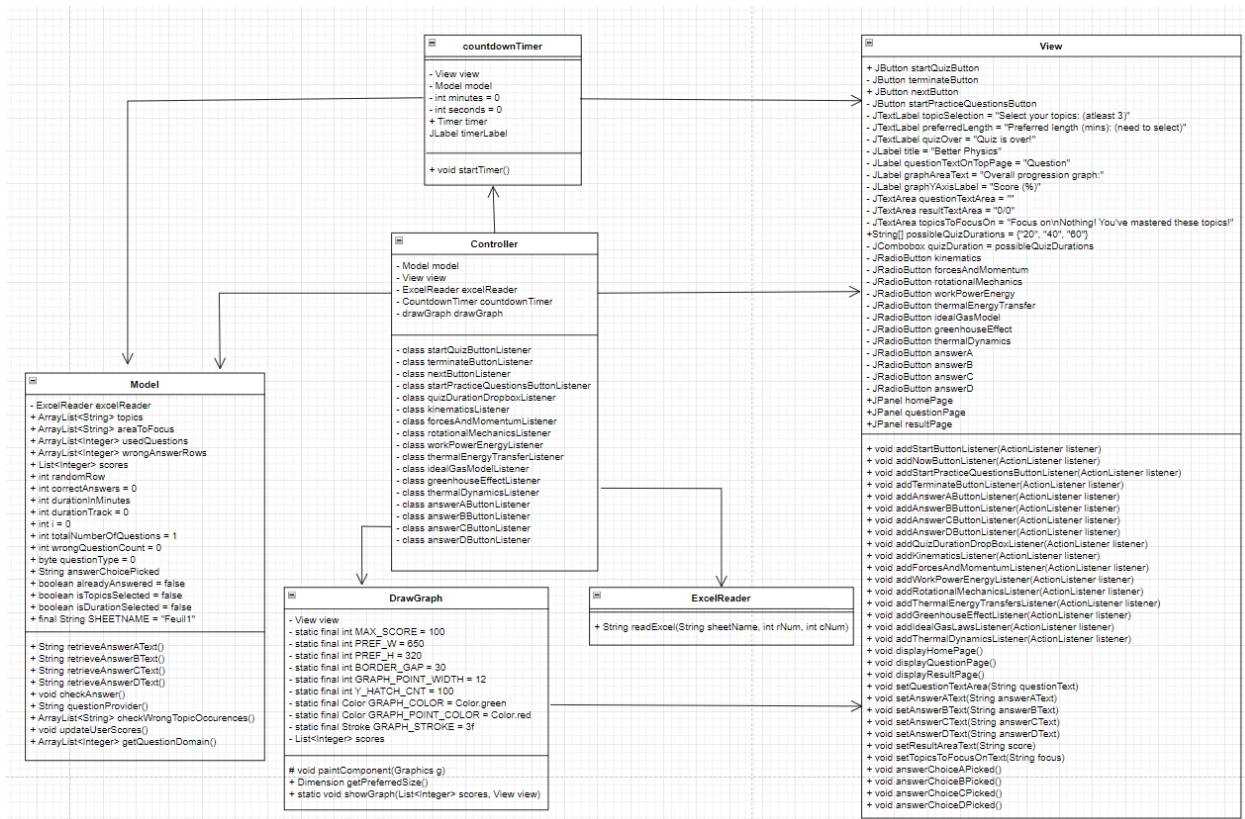
retrieveDataFromExcelFile method: how does the program retrieve data from the Excel file:



Make sure the quiz doesn't repeat questions:



UML:



Question Pool Excel File:

Excel file used to store all the questions

	A	B	C	D	E	F	G	H
1	Questions	Topic	Answer choice A	Answer choice B	Answer choice C	Answer choice D	Correct answer	Duration
2	Which of the following is a vector quantity?	Kinematics	Speed	Electric force	Electric current	Temperature	B	1.
3	A car of mass m is descending a slope. The car, initially at rest, covers a distance of 27.0m in 3s.	Kinematics	3.0 m/s^2	6.0 m/s^2	9.0 m/s^2	81.0 m/s^2	B	1.
4	An object moves at constant velocity for a period of time, after which it undergoes uniform deceleration until it comes to rest. A velocity-time graph is plotted for this motion. On the graph, which of the following represents the displacement of the object?	Kinematics	Gradient of the line connecting the initial and final velocities	x-intercept	y-intercept	Area under the graph	D	1.
5	An object of mass M on a string moves in a circle of radius r at a constant speed. Which of the following statements is true about the motion of the object: I. The resultant work done on the object is zero. II. The velocity of the object is constant. III. The object is accelerating	Kinematics	I only	II only	II and III only	I and III only	D	1.

Test plan:

Success criteria	Use case (normal, abnormal, extreme)	Action to test	Method of testing	Expected result
The program can access the excel file that store all the questions and their respective solutions	Check that the program can read the questions and solutions from the Excel file accurately - normal case	Instruct the program to retrieve questions and solutions from the Excel file.	Test if the program retrieves the correct data according to specified cells	The program can read the Excel file correctly and accurately
Randomized questions for both practice questions and quiz questions	Verify that the program generates a question randomly - normal case	Instruct the program to randomly generate a question from a specific study topic	Check if the question is from the specific topic chosen	The program provides and displays a randomly generated question according to the specified study topic
3 pages in total: -1 home page -1 question page -1 result page	Verify the program only alternates between the home page, question page, and result page - normal case	Run the program normally	Observe if there are any pages that lack certain GUI components	All 3 pages are functioning and display what they're supposed to
Pages can be easily navigated using buttons	Verify that the program runs in response to the buttons being clicked - normal case	Run the program normally	Observe if the program functions as intended	The program is functional and can be navigated with the buttons
Pages can be easily navigated using buttons	The user does not interact with any of the buttons - abnormal case	Run the program normally	Observe if the program functions as intended	The program stays where it is at
Feature to select out of 8 physics topics for the quiz in the home page: -Kinematics -Forces and momentum -Work, power, energy -Rotational mechanics -Thermal energy transfers -Greenhouse effect -Ideal gas laws -Thermodynamics	Verify that the user is able to choose study topics out of 8 that are correctly displayed ones - normal case	If the buttons are visible on screen and are enabled when necessary	Click on the topic buttons to see if that makes changes to the ArrayList where all the chosen topics are stored; observe if they're in the intended position on the screen	All buttons are functioning and 8 of them correctly displays
Feature to choose 1 of 3 possible quiz lengths in terms of time in the	Verify that the user is able to choose a duration for the quiz	If the drop box is visible on screen and are enabled	Choose a duration for the ComboBox and check if the	The ComboBox is working and displays itself

home page: -20 mins -40 mins -60 mins	out of 3 that are correctly displayed - normal case	when necessary	value has been correctly stored inside a variable; observe the intended position on the screen	correctly
Questions are given to the user according to the chosen topics in both quiz and practice questions	The randomly generated question's topic corresponds to the ones the user initially selected - normal case	Instruct the program to randomly generate a question once the quiz has started and check the topic a question	Test if the program correctly retrieves questions according to the user's selections	The program generates questions according to the user's selection of study topics
User only able to start the quiz if at least 3 topics is selected and a duration is selected in the home page	Verify that the user is only able to click on the start quiz button after selecting at least 3 topics AND a duration - normal case	Run the program and check if the start quiz button is enabled and when it is disabled	Observe the behavior of the start quiz button in response to changes in topics and duration	The start button should only be enabled when at least 3 topics and a duration is selected
User only able to start the quiz if at least 3 topics is selected and a duration is selected in the home page	The user does not select at least 3 topics or a quiz duration - abnormal case	Run of program normally	Check the behavior of the start button	The user is not able to press on the start button
The retrieved data from the excel file is correctly displayed in the question page	Check if the program displays the data that has been retrieved - normal case	Instruct the program to retrieve and display the data from the Excel file.	Test the program's functionality by observing its behavior in displaying the data.	The program should display all data fields and records retrieved from the Excel file accurately and without any loss of information.
The retrieved data from the excel file is correctly displayed in the question page	Data from Excel file has been modified - abnormal case	Instruct the program to retrieve and display the data from the Excel file.	Test the program's functionality by observing its behavior in displaying the data.	The program should display all data fields and records retrieved from the Excel file accurately and without any loss of information.
The retrieved data from the excel file is correctly displayed in the question page	Excel file's format has been changed - extreme case	Check if the program is still functioning as intended	Switch up the columns in the Excel file	The program would not be functional
Timer only displays and functions during quiz in the question page	Verify that the timer is available during the quiz - normal case	Run the program normally	Observe if the timer is being displayed during the quiz	The timer should function and display itself during the quiz
Timer only displays and functions during	Check that the timer does not function	Run the program normally	Observe if the timer is being displayed	The timer should not display and function

quiz in the question page	during the practice questions - normal case		during practice questions	
The user can only choose from 4 answer choices with 1 correct answer in the question page	Check that the program only displays 4 answer choices to select from within which only 1 of them is correct - normal case	Select all the wrong answers first to make sure there isn't more than one correct answer	Observe the behaviors of the answer buttons	The program displays 4 answer choices and only 1 of them is correct
Feature to terminate the quiz or the practice questions whenever the user wants in the question page: -Resets everything -Brings user back to the home page	Verify if the program brings the user to the home page after the terminate button is clicked and is able to run without error - normal case	Terminate the program during the quiz and start the quiz again	Test if the GUI components' behaviors are intended and everything runs the same as the first time	The program brings the user back to home page and runs error-free afterwards
User's solutions are checked with the correct solutions for both practice questions and quiz questions once an answer is selected	Verify that the program accurately checks user-selected answers against the correct solutions for each question - normal case	Submit the selected answer to the program for verification against the correct solution.	Manually select different answer options for each question.	When the user selects the correct answer, the program should acknowledge the correctness
Correct or wrong answers are displayed (green = correct; red = wrong)	Verify that the answer choice buttons behaves as intended once they are selected by the user - normal case	Instruct the user to click on the answer choices during program execution	Observe the behaviors of the answer buttons	The buttons should disable themselves when selected. Turn red if the option is wrong and turn green if the option is correct
Correct or wrong answers are displayed (green = correct; red = wrong)	Answer choices not selected by the user - abnormal case	Run the program normally	Observe the behaviors of the answer buttons	Stay as they are until they are selected
User only able to go to the next question if the correct answer is selected in the question page	Verify that the user is able to click on the next button once the correct answer has been selected - normal case	Instruct the user to selected the answer choices until getting the correct one	Observe the behavior of the next button	The button should enable itself when the correct answer has been selected
User only able to go to the next question if the correct answer is selected in the question page	Verify that the next button is disabled when the user hasn't selected the correct answer - normal case	Instruct the user to select the wrong answers	Observe the behavior of the next button	The button should be disabled and not interactable

Feature that ensures the user does not to get the same question more than once	Ensure that each question is unique inside the quiz - normal case	Instruct the program to generate questions repetitively	Repeat the process of generating questions multiple times, ensuring that previously generated questions are not repeated by storing all the previously used questions in a collection.	The program should generate questions without repeating any previously generated questions in the quiz
Feature that ensures the user does not to get the same question more than once	The program has used all the possible questions stored in the Excel file - extreme case	If the program is functional after all the questions has been used once	Select all the topics in the home page and complete all the questions given	The program crashes
Feature to show what study topics the user needs improvement on in the result page	Verify that the program accurately identifies and presents to the user the topics they need to focus on based on their performance in the quiz - normal case	Simulate user interactions with the program, including answering questions or completing assessments covering various topics.	See if what is being displayed corresponds to the logic of the algorithm that decides if a topic should be considered one to be focused on	The program should accurately analyze user performance data and provide recommendations on topics that the user needs to focus on.
Feature to show what study topics the user needs improvement on in the result page	Only functions for 20, 40, and 60 minutes quizzes - abnormal case	Modify the possible duration of the quiz in code	See if this feature functions after completing the quiz	Does not function
Feature to show the user's score from the quiz in the result page	Verify that the program correctly displays the user's score in the quiz - normal case	Simulate user interactions and keep in track of the score I get	See the displayed result by the program corresponds to the one I tracked	The program should correctly display the user's score in the quiz
Feature to show the user's score from the quiz in the result page	Verify that the maximum score is based off how many questions the user did during the quiz - abnormal case	Instruct the user to do 2 questions and wait until the timer runs out	Check the score displayed in the result page upon quiz completion	The program should display the score as $n/2$ where n is an integer
Feature to show the graph of the user's progress in terms of their score in quiz with time on the x-axis and score on the y-axis of the overall progress in the result page	Verify that the progression graph is functioning as intended - normal case	Redo the quiz a several times and check if the points being plotted on the graph corresponds to the scores I got	Observe the graph's trend	The graph accurately shows the score the user gets in each quiz they take
Feature to show the graph of the user's progress in terms of	Check if the data points are still plotted after the	Close the program after completing the quiz once and	Check if the data from previous program execution	The program does not have persistent data, the data will

their score in quiz with time on the x-axis and score on the y-axis of the overall progress in the result page	program is closed - abnormal case	re-execute the program	is displayed in the graph	be deleted if the program is closed
Feature to let the user redo the questions where they've answered incorrectly from the quiz in the practice questions	Verify that the user is able to redo the questions where they answered incorrectly during the quiz in the practice questions - normal case	Take the quiz and note down the questions I got wrong on	Test if the program correctly lets the user redo all the wrongly answered questions from the quiz	The program allows user to redo all questions they answered incorrectly during the quiz in the practice questions