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Introduction

Tātai is a mathematics aid designed to support students' learning by offering them an interactive forum in which to practice basic arithmetic. The application is targeted at primary school children, learning in a classroom environment, whose first language is te reo Māori. Tātai has also been created with primary school teachers in mind.

The application offers two modes of operation: student mode and teacher mode. Student mode allows a learner to play a variety of games, view their own progress and compare their scores with their classmates. Teacher mode facilitates targeted learning through the custom creation of quizzes. Teachers are also able to track each students' progress.

Tātai aims to improve the speed and accuracy of young to reo Maori speakers' arithmetic by involving them a positive and helpful learning experience that is tailored to them. A number of useful application features come together to create this experience. This manual discusses these features in depth and describes how to use them.

Launching Tātai

The use of Tātai has several system requirements:

- It must be run on a Linux platform.
- The system must have ffmpeg installed - `sudo apt-get install ffmpeg`
- A working microphone.
- The HTK speech recognition toolkit must be installed - please see <http://htk.eng.cam.ac.uk/> for more information.
- A Java runtime environment supporting JavaFX.

Running the application is simple. Place the supplied jar file in the same directory as the folder named “resources”. Navigate to this directory from the command line and simply type:

```
java -jar Tatai.jar
```

You will be presented with the login screen and are now good to go! Enjoy the game!

1 Logging In

Tātai is designed for use in the classroom, hence the entry point of the program is a login screen, as shown in Fig. 1.1 below.



Figure 1.1: The login menu

There are several options you may select when logging in, these are shown in Fig. 1.2.

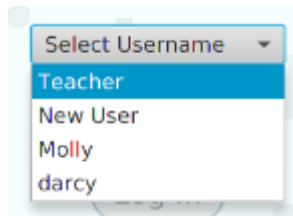


Figure 1.2: Login options

If you are a new user, select this option and enter your name in the text field that shows up. Your username must be unique, and may only consist of letters, numbers, hyphens, and underscores. The login button will enable itself once you provide a valid username.

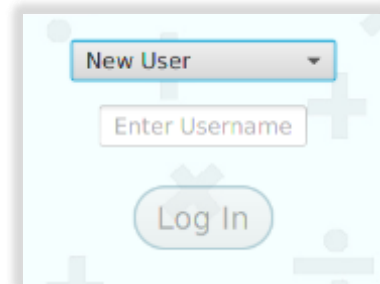


Figure 1.3: Login as a new user

If you are a teacher wanting to use Tātai to monitor and support the learning of your students, then select the teacher option. You will be prompted for a password. Simply type the default password “admin”, and click the login button.

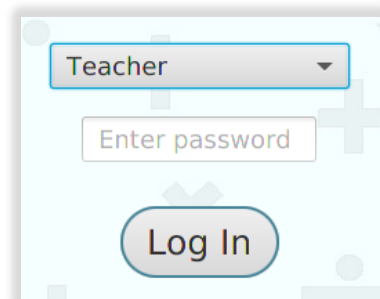


Figure 1.4: Login as a teacher

2 Teacher Mode

Using Tātai as a teacher allows you access to features that help you analyse your students' progress and support their learning.

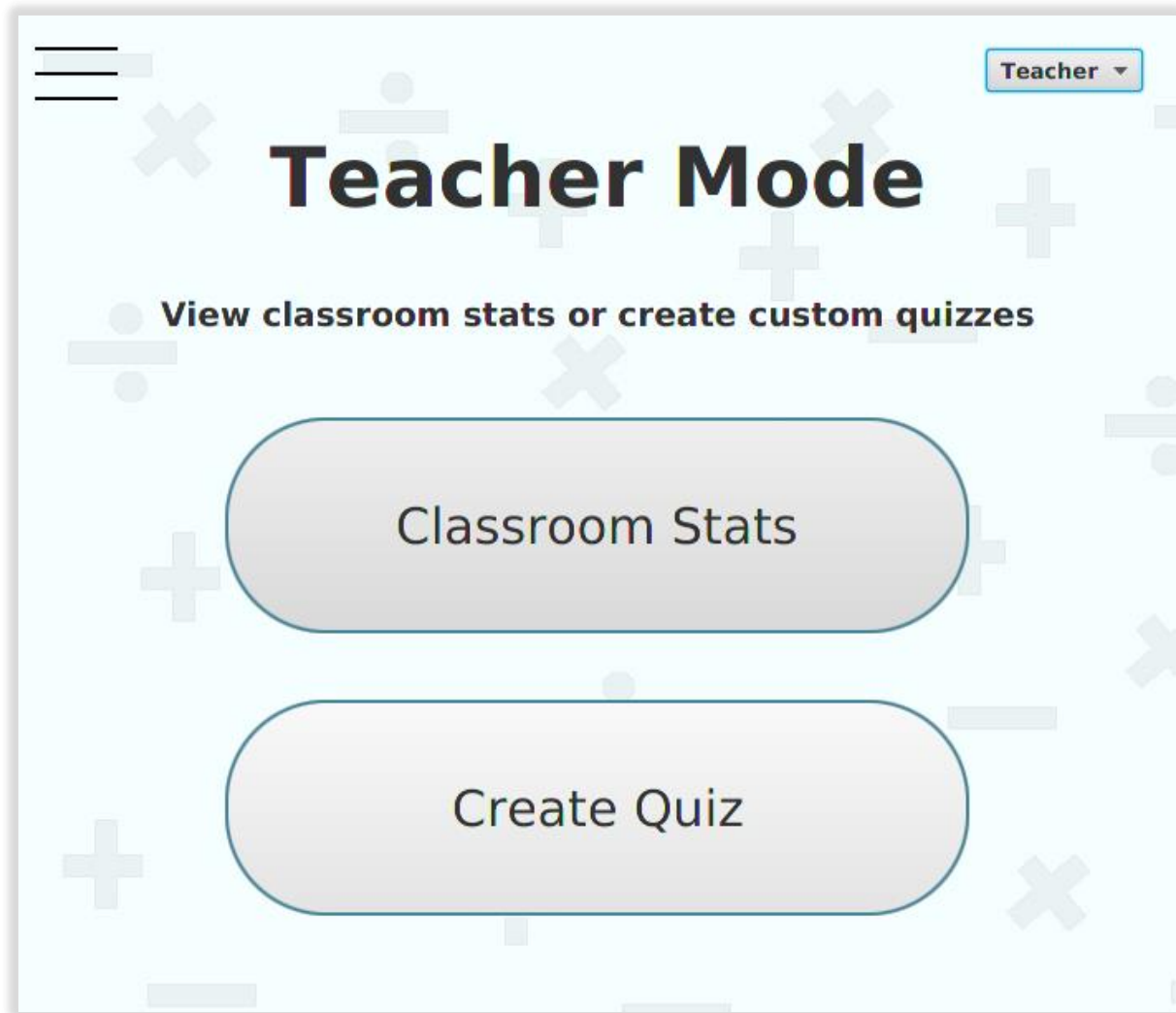


Figure 2.1: Teacher mode home screen

The main functionalities offered in teacher mode are viewing classroom statistics and creating custom quizzes. Both of these features have been designed with the aim of helping you help your students.

2.1 Creating Custom Quizzes

If you wish to focus your students' learning on specific mathematical concepts (as opposed to the standard randomly generated quizzes they will be playing), then you should make use of the ability to create your own quizzes. Tātai allows you to write your own set of equations, and save them for your students to play.

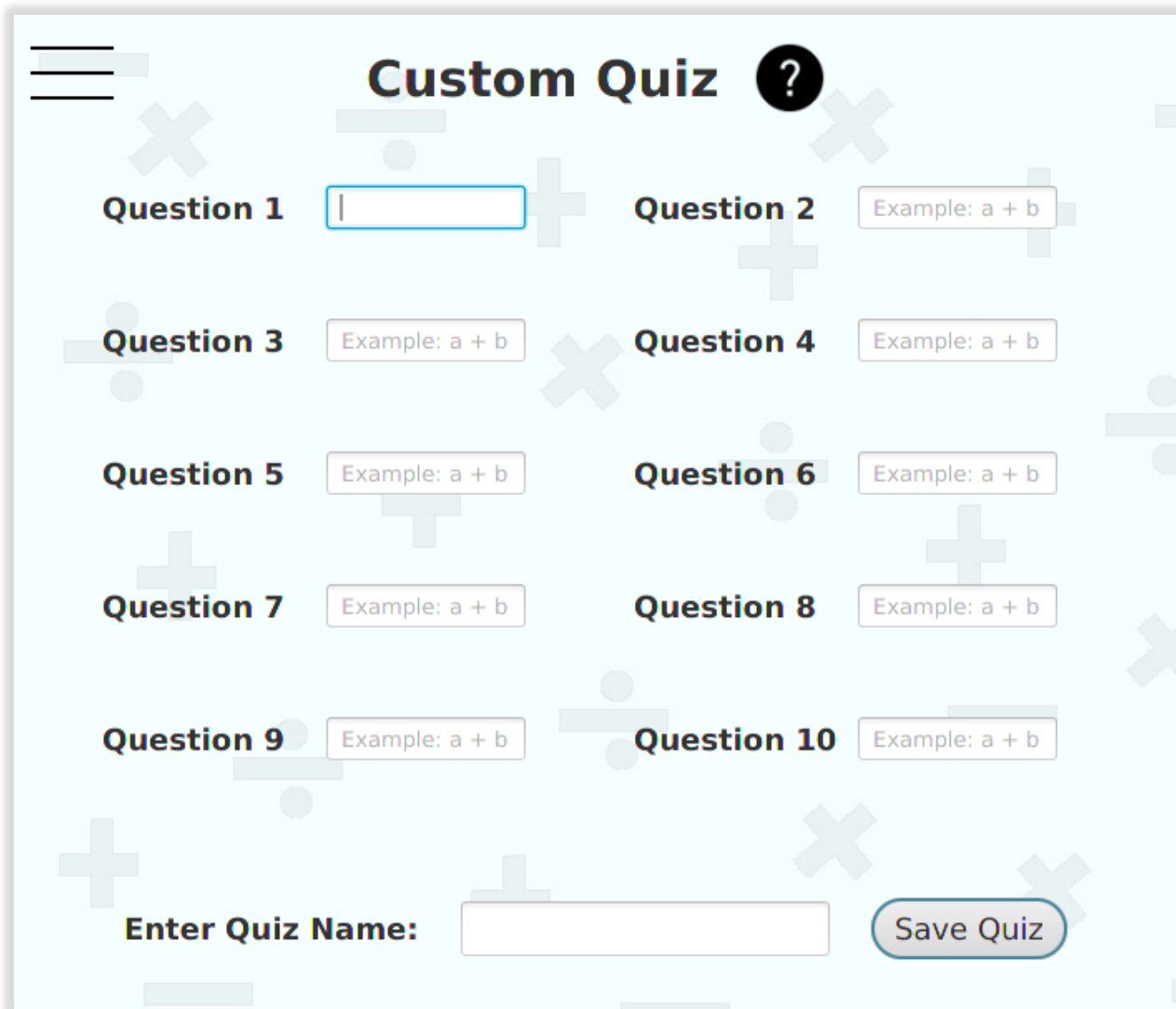
The image shows a web interface for creating a custom quiz. At the top, there is a hamburger menu icon on the left and the title "Custom Quiz" followed by a question mark icon. Below the title, there are ten question slots arranged in two columns. Each slot consists of a label (e.g., "Question 1") and a text input field. The first input field is empty, while the others contain the text "Example: a + b". At the bottom of the interface, there is a label "Enter Quiz Name:" followed by a text input field, and a "Save Quiz" button to its right. The background of the interface is light blue with faint mathematical symbols like plus, minus, multiply, and divide signs scattered across it.

Figure 2.2: The custom quiz creator

Creating a quiz is easy. Simply provide ten equations of your choice. You need only provide the left hand side of the equation, as Tātai knows how to calculate the answer.

There are some **constraints**:

- Equations must consist of a single operation, with two operands on either side of it. For example “9 - 3” is allowed, but “2 + 8 + 1” is not.
- The operation must be either “+”, “-”, or “x”, as division is not yet in the curriculum for the intended users of Tātai.
- The answer must be between 1 and 99, as these are the numbers that Tātai’s voice recognition system supports.

If these constraints seem unclear, then don’t worry! The quiz creator gives you feedback each time you update an equation on whether it is acceptable or not. See Fig. 2.3.



Figure 2.3: Custom equation constraints

Once you have provided ten valid equations, you may save the quiz. To do this, enter an optional name and simply click the “save quiz” button.

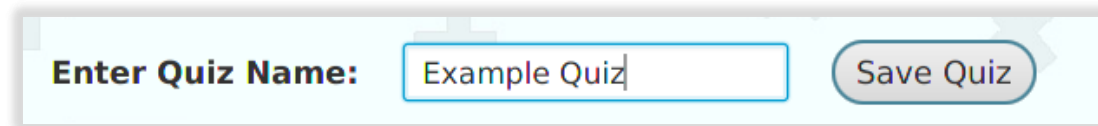
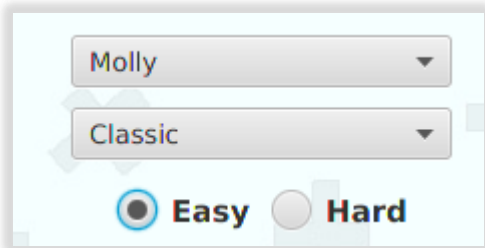


Figure 2.4: Naming a custom quiz

The quiz will be saved and the creator screen wiped clean for you to start writing your next quiz right away!

2.2 Viewing Classroom Statistics

Tracking your students' progress is easy with Tātai. Upon pressing the “Classroom Statistics” button, you will be prompted to select a user, game mode and level for which to display progress.



You can do so using the controls shown in Fig. 2.5. The relevant scores will then be plotted on the progress chart and useful data will appear on the right-hand side of the screen. This is illustrated in Fig. 2.6.

Figure 2.5: Class stats controls

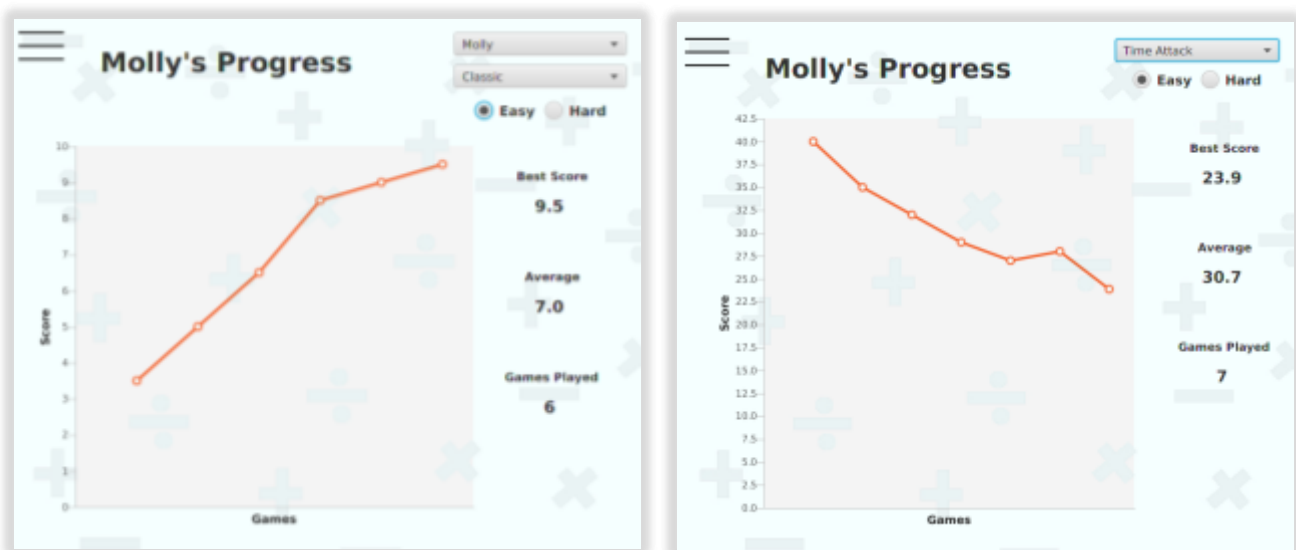


Figure 2.6: User progress examples

3 Home Screen

If you are a student, the first thing you will see after logging in is the home screen shown in Fig. 3.1.



Figure 3.1: Home screen

From here you may access the games menu, practice mode, and the statistics menu. In order to navigate to the desired part of Tātai, simply click the button corresponding to where you want to go.

The menu bar in the top corner shows which user you are currently logged in as, and offers a dropdown logout button for if you wish to switch users.

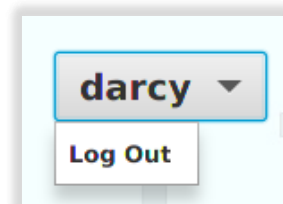


Figure 3.2: Log Out

4 Playing Games in Tātai

4.1 How to Play

A game in Tātai consists of a number of math equations. For each equation you must figure out the answer, and when you are ready you must attempt to answer the equation by pronouncing it in Te Reo Māori. Fig. 4.1 shows what a typical game looks like. Each game mode is slightly different but the main components of the screen do not change.



Figure 4.1: Example of a game in Tātai

At any point in the game, you will know which question you are on and your score will be presented to you.

When you think you know the answer, press the record button. This will give you three seconds to say your answer. Take Fig. 4.1 as an example. The answer is 7, so you would press record and say “whitu”.

Tātai will process your answer and instantly let you know how you did. Fig. 4.2 shows what both possible outcomes look like.

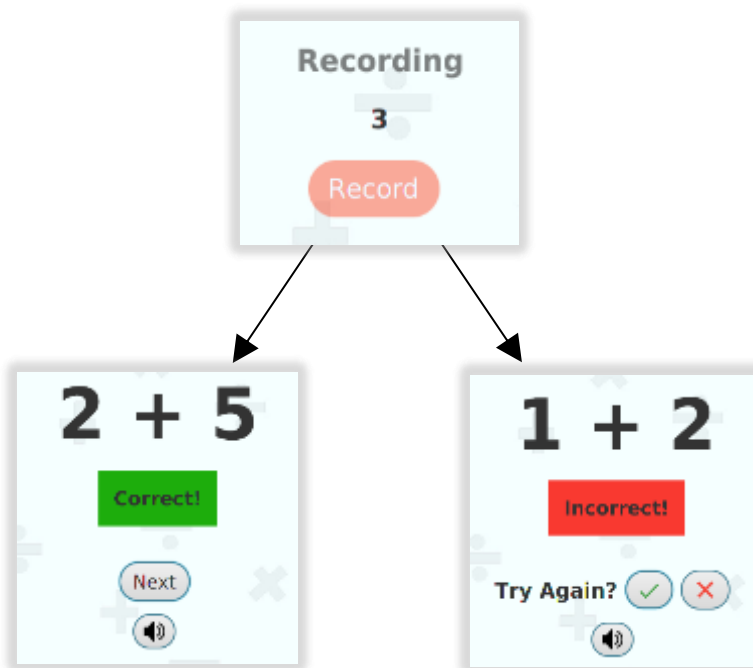


Figure 4.2: Correct and incorrect answers

After recording any question, you have to option to playback your recording. To do this simply click the speaker icon. See Fig. 4.3.



Figure 4.3:
Play back icon

If asked to try again, clicking the tick icon will start recording again to give you a second attempt. Clicking the cross icon will take you to the next question. See Fig. 4.4.

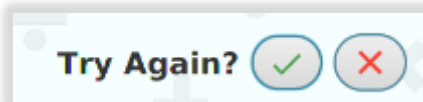


Figure 4.4: Try again

Clicking the next button shown in Fig. 4.5 will take you to the next question.

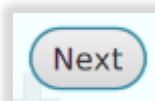


Figure 4.5:
Next button

This is essentially all there is to playing games in Tātai. However, as previously mentioned, there are some differences between game modes. These are explained in the following sections.

4.2 Difficulty

Tātai games are available in two different levels of difficulty, “easy” or “hard”. The only way these vary is in the equations that are generated. “Easy” consists of simple addition and subtraction involving numbers from 1 to 9. “Hard” consists of multiplication from 1 to 9, and addition and subtraction from 1 to 99.

4.3 Game Modes

Tātai offers four separate game modes. Each of these games has near identical gameplay as described in the “how to play” section. However, each game mode has its own structure and is scored slightly differently. These are described in this section.

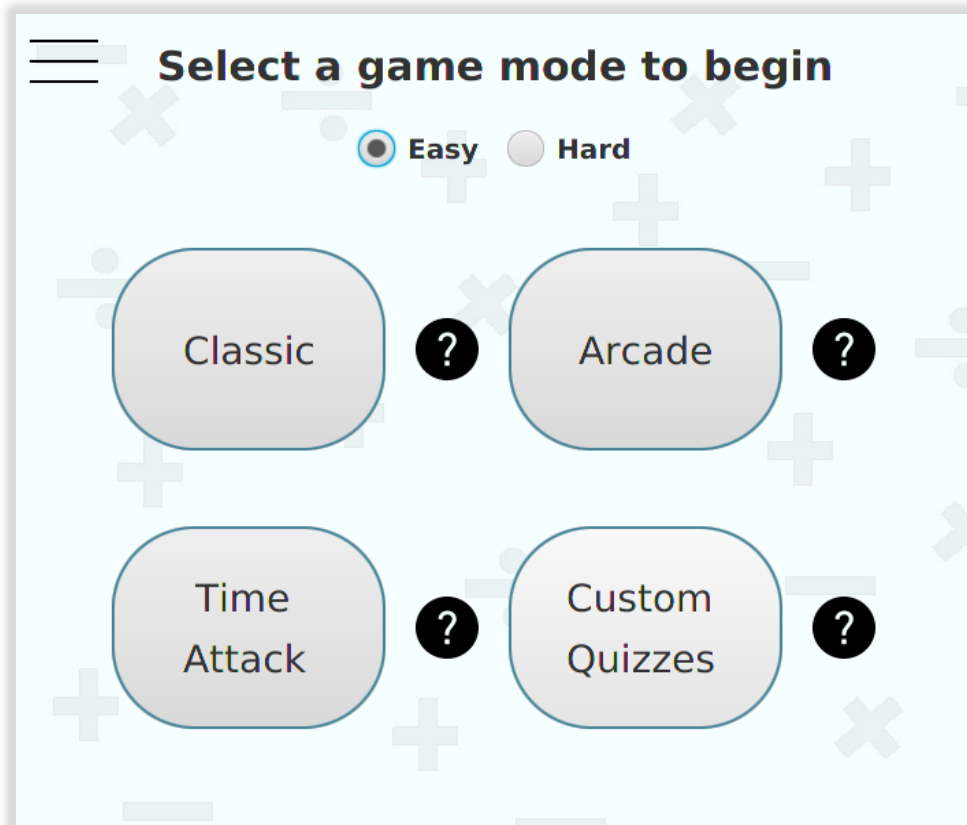


Figure 4.6: Game mode

The games menu is shown in Fig. 4.6. To start a game, select the difficulty you want to play, and click the button corresponding to the desired game mode.

4.3.1 Classic

A “classic” game consists of ten equations. You get up to two attempts for each equation, and the scoring system is as follows:

- The score is out of 10.
- If you get an equation correct on the first attempt you get one mark.
- If you take two attempts to get the equation correct, you get half a mark.
- If you can’t get the answer right after two attempts, you get no marks.



Figure 4.7: Classic score

In classic mode, your score at any time is shown in the top right corner. You are also shown what question number you are on, and are given a visual indication of how you fared on each question.

4.3.2 Arcade

In “arcade” mode, you have one minute to solve as many equations as you can. To speed things up, you are only allowed one attempt per question. You are also allowed to skip questions if you think you will take too long to solve it. The score for this game mode is simply how many equations you solved in the given time.

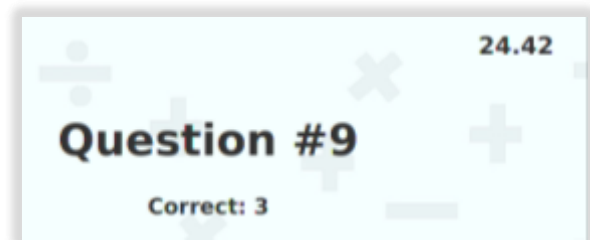


Figure 4.8: Arcade score

4.3.3 Time Attack

A “time attack” game consists of ten equations. You may not move on to the next equation until you solve the current one. The idea with this game mode is to solve the ten equations as quickly as you can. Your score will be your time, and the shorter your time is the better the score.

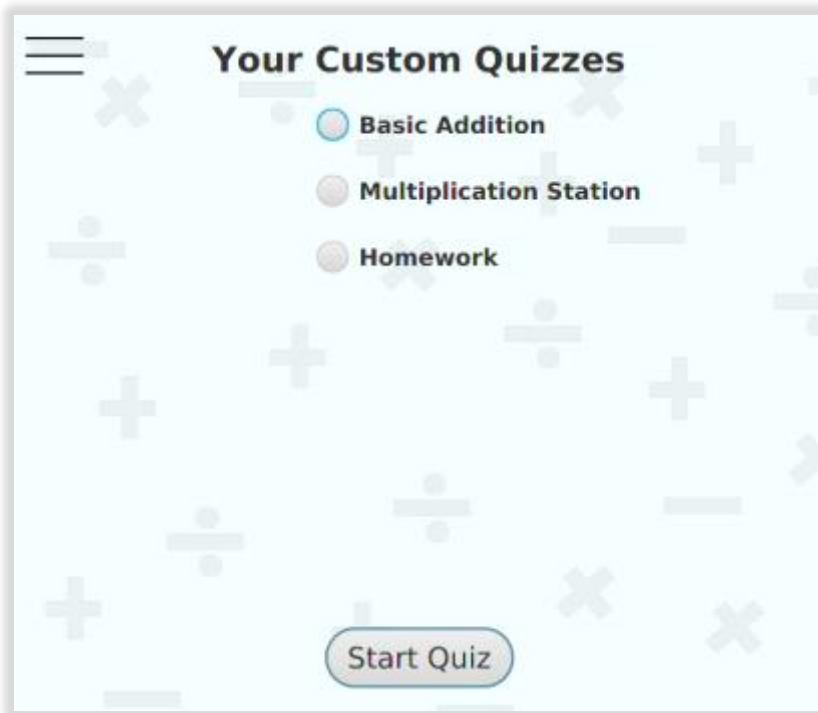


Figure 4.9: Time attack score

Both arcade and time attack modes show a timer in the top right, so you know how much time has passed. Arcade mode also shows you how many equations you have solved. See Fig. 4.8 and 4.9.

4.3.4 Custom

“Custom” games are identical to “classic” games, however the sets of equations are not randomly generated, but are created by your teacher to focus your learning on specific concepts.



Before starting a custom game, you will be taken to a menu where you may select which quiz you wish to play.

Simply click the button corresponding to the quiz you want to play, then click the “start quiz” button.

Figure 4.10: Custom quiz selection menu

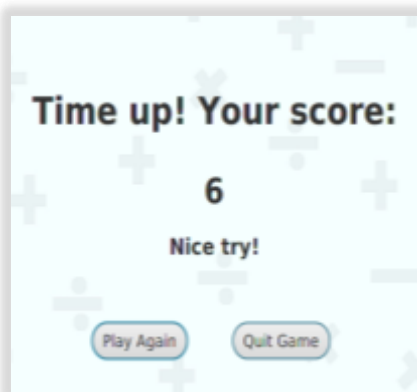


Figure 4.11: End of Arcade mode

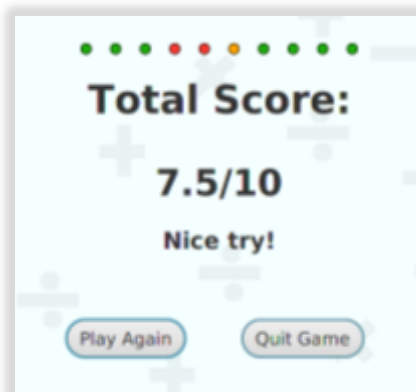


Figure 4.12: End of Classic mode



Figure 4.13: End of Time Attack mode

Fig. 4.11, 4.12 And 4.13 show the end of “arcade”, “classic”, and “time attack” games respectively.

As seen in the figures, upon completing a game you may either quit the game, which will take you back to the home screen, or you may play again, which will start another game of the same game mode and same difficulty as what was just played.

5 Practice Mode

You may wish to practice your arithmetic without your score being tracked. Practice mode offers exactly this and has a helpful interface that gives you an idea of how you are doing.

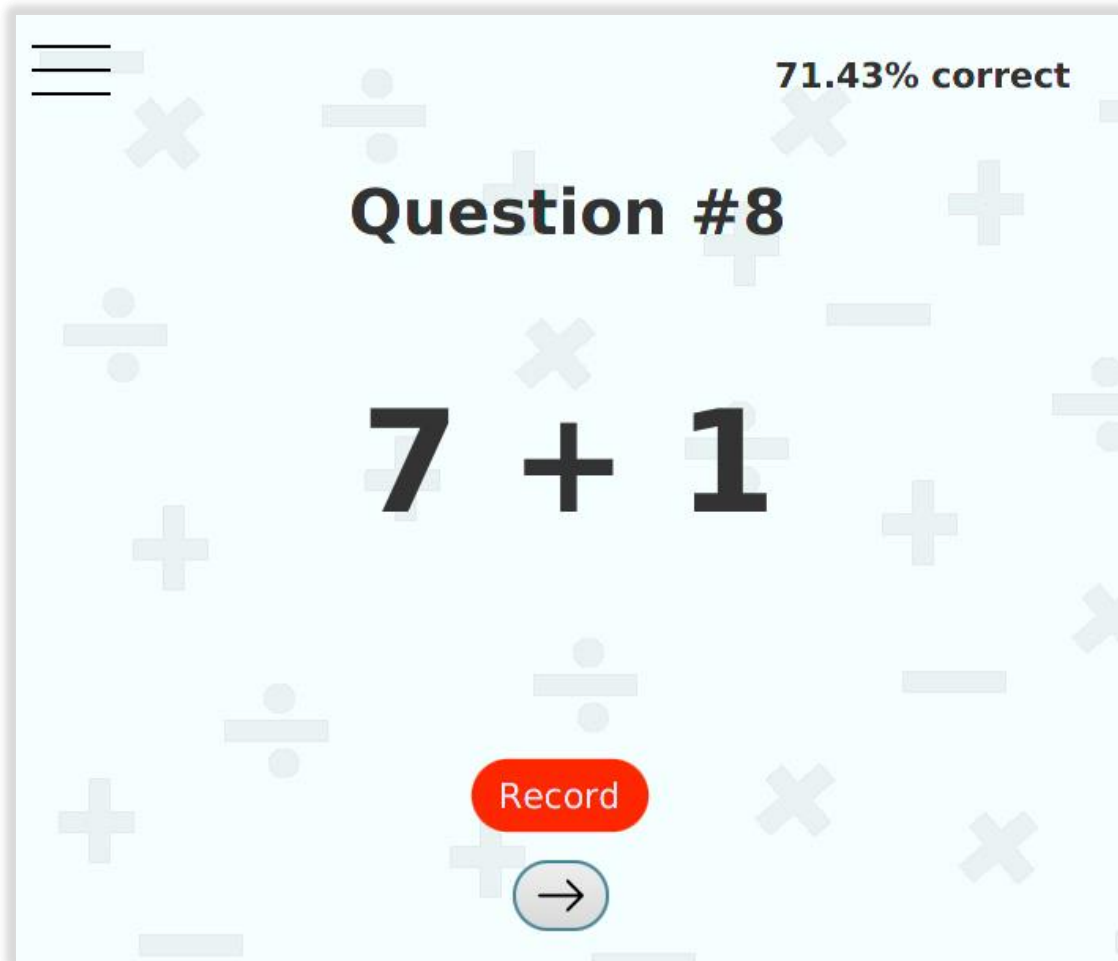


Figure 5.1: Practice mode screen

You may play this mode for as long as you want. Tātai will continue generating equations for you until you choose to exit practice mode.

In practice mode you have unlimited attempts at any given question, but you may choose to skip a question if you get stuck.

71.43% correct

Figure 5.2: Practice percentage label

The label in the top right corner (Fig. 5.2) tells you the percentage of equations you have answered correctly, which is a nice indication of how well you are doing.

6 Statistics

As a student, you are able to view your progress in the “Statistics” section of the application. Tātai records your scores for the game modes “Classic”, “Arcade” and “Time Attack”. The level at which you played each game is also recorded.

The “Statistics” menu screen is shown in Fig. 6.1. You can view your individual progress by selecting “My Stats”. Selecting “Classroom Stats” allows you to compare results with your classmates!

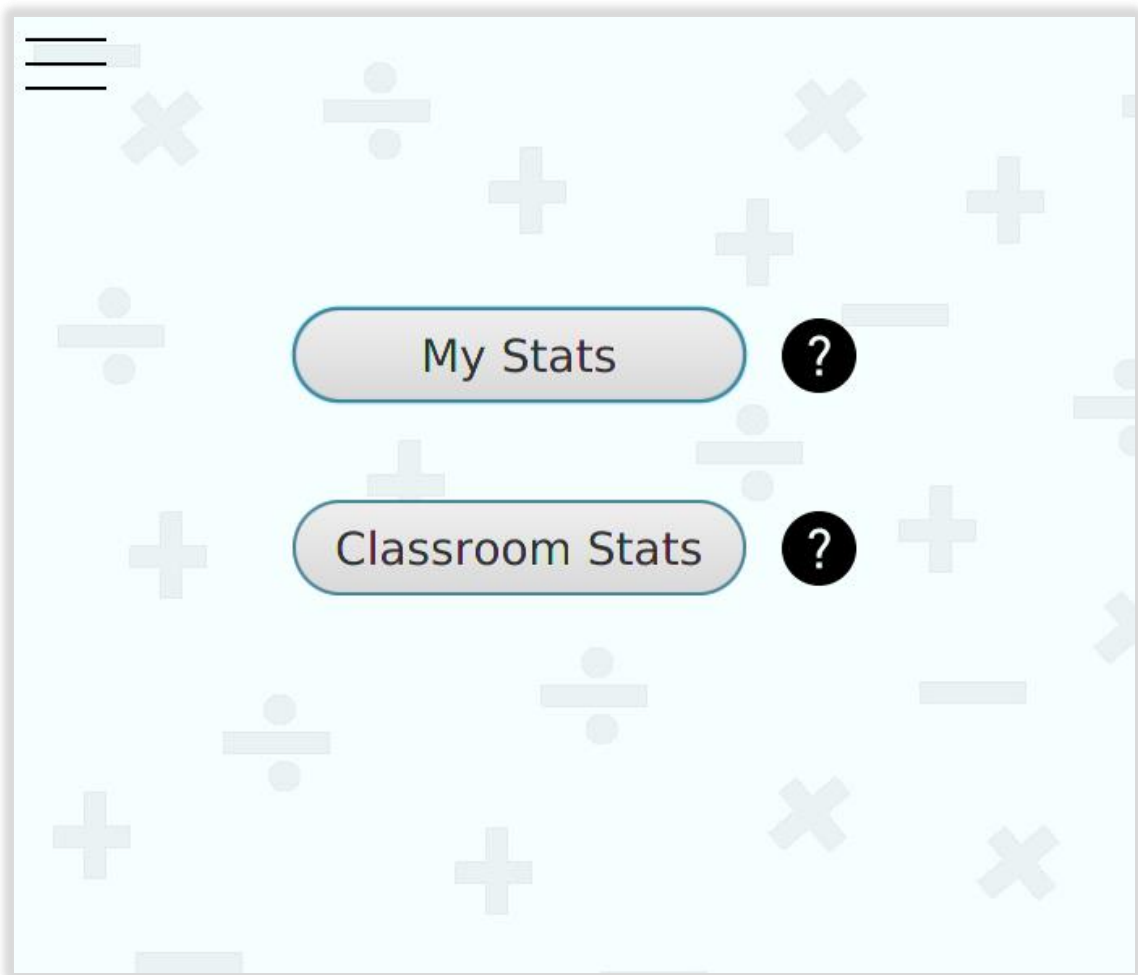


Figure 6.1: Statistics Menu

6.1 My Statistics

“My Stats” tracks your individual progress. When you click “My Stats”, you will be shown the screen in Fig. 6.2 asking you to select a game mode and level.



Figure 6.2: My Stats screen

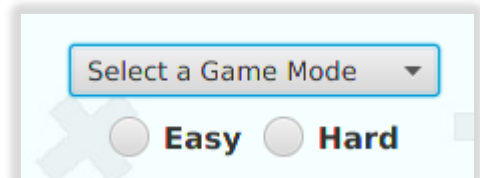


Figure 6.3: My Stats controls

You can select a game mode and level for which you want to display your progress using the controls shown in Fig. 6.3.

The results of all games played by you in the selected mode and level will be displayed on the progress chart in the order that you played them. To the right of the progress chart are your best and average scores for the selected game mode and level, as well as the number of games you have played. See Fig. 6.4.

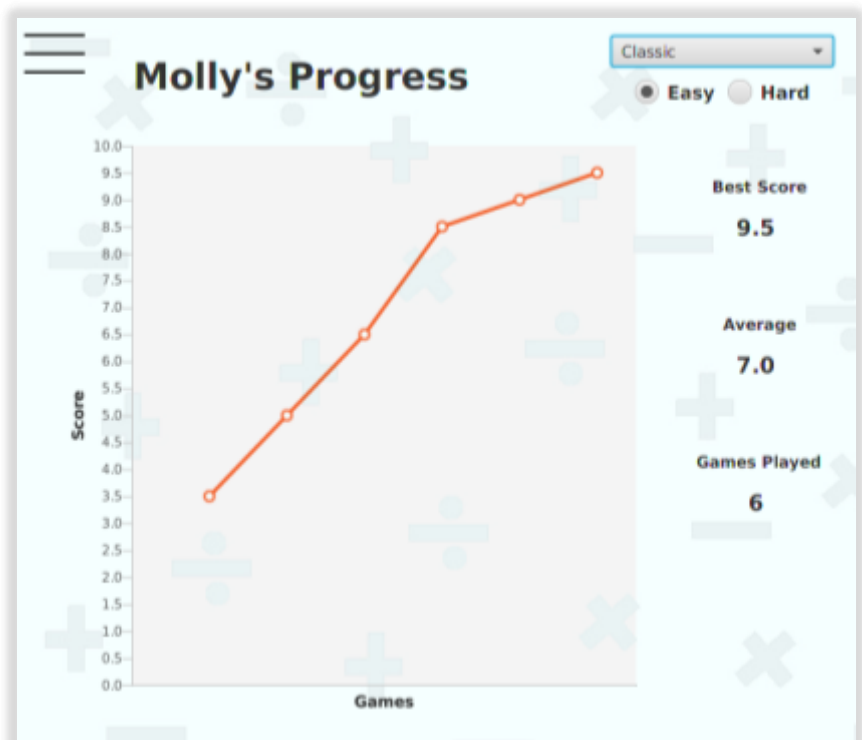


Figure 6.4: Populated progress chart

6.2 Class Statistics

“Class Stats” presents the classroom’s highest scoring students as “medalists”. After clicking “Class Stats”, you will be presented with the screen shown in Fig. 6.5.



Figure 6.5: Initial class leaders screen



Figure 6.6: Class leaders screen with data

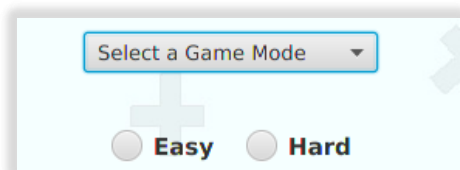


Figure 6.7: Class leaders controls

You can select a game mode and level using the controls shown in Fig. 6.7.

The gold, silver and bronze medalists for the selected game mode and level will then be displayed as shown in Fig. 6.6 above. If you can't see your name on there yet, don't worry! Keep practicing to improve your scores to earn a medal.

7 Getting Around

Tātai's navigation bar allows you quick access to areas of the application without having to return to the home screen. On most application screens, a menu icon (Fig. 7.1) is visible in the top, left-hand corner. To view and use the navigation bar, hover the mouse over the menu icon (Figure 7.3).

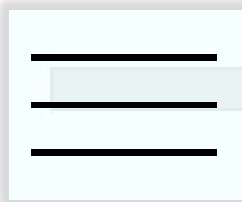


Figure 7.1: Menu icon

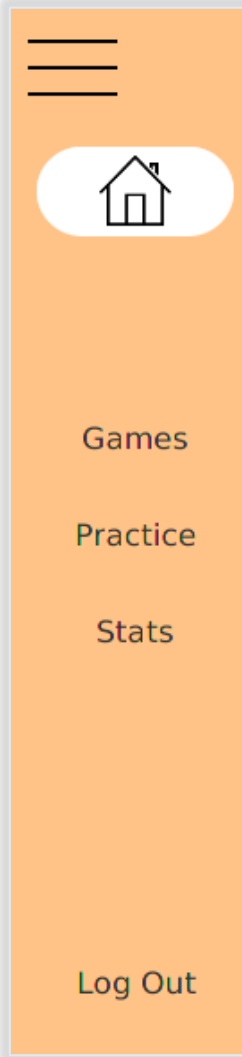


Figure 7.2: Navigation bar home button

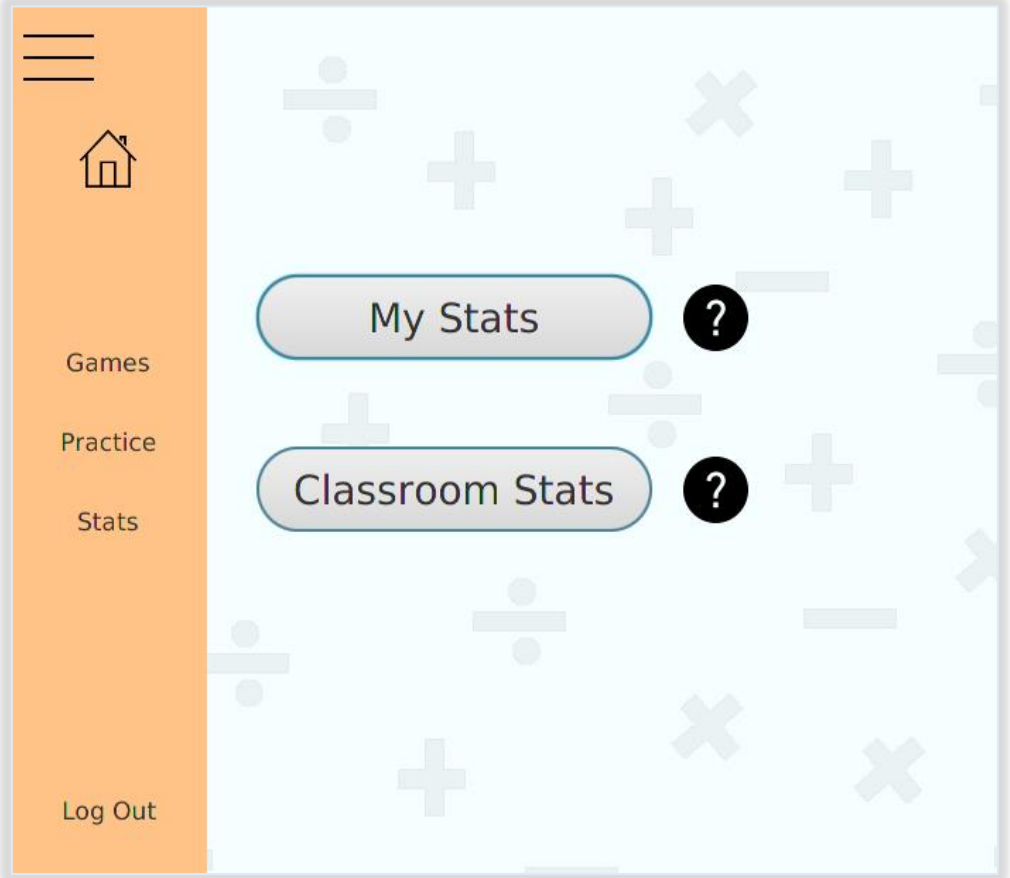


Figure 7.3: Navigation bar on screen

The home button in the navigation bar (shown in Fig. 7.2) allows you to return to the relevant home screen from almost anywhere in Tātai. Returning home from practice mode or in the middle of a game will cause all progress to be lost. Don't worry, Tātai will confirm that you want to exit in these situations.

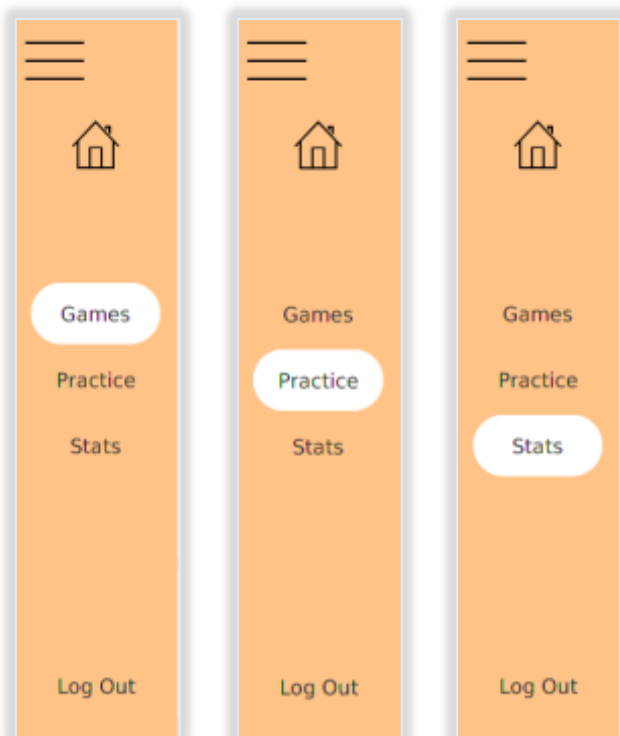


Figure 7.4: Basic navigation bar features

The “Games”, “Practice”, and “Stats” buttons are available from all screen when a student is logged into Tātai. Each button takes you to the relevant section of the application.

The “Back” button is sometimes available in the navigation bar. It allows you to return to the last screen you were on. You cannot go back to a game or practice mode session once you have exited it.

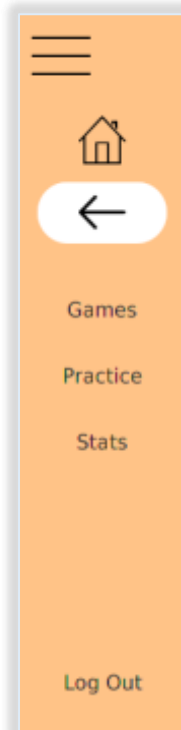


Figure 7.5: Back button

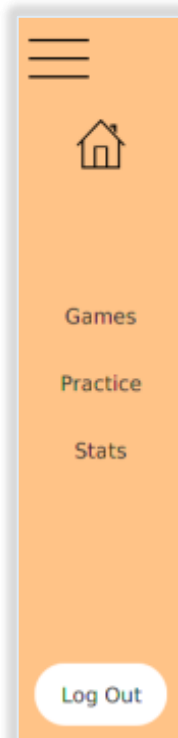


Figure 7.6: Log out from

The log out button, located at the bottom of the navigation bar, allows users to log out from almost any screen in the application. Logging out will mean all current game or practice session progress will be lost. Tātai will confirm that you are sure you want to log out! See Fig. 7.6.

The new quiz button, shown in Fig. 7.7, is only available in Teacher Mode. It allows a Teacher to navigate to the “Create Custom Quiz” screen from almost anywhere in Tātai.

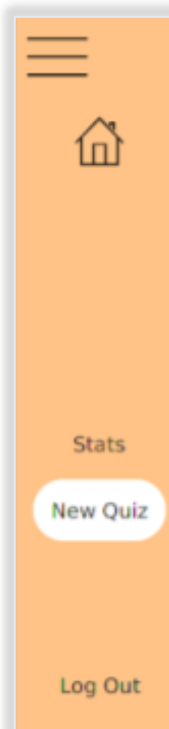


Figure 7.7: New quiz button

8 Getting Help

If you are ever unsure how to proceed while using Tātai, look out for the help icon shown in Fig. 8.1.



Figure 8.1: Help icon

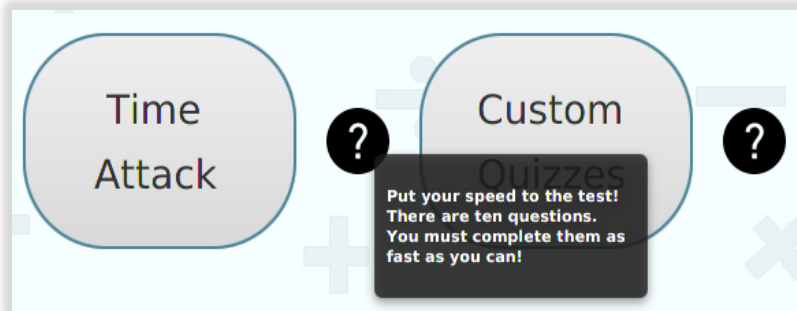


Figure 8.2: Helpful hints

On top of the help icons throughout the program, an interactive tutorial that walks you through how to play a game in Tātai is provided. This tutorial is accessible by opening the navigation bar from within the games menu and clicking the help icon (as shown in Fig. 8.4).

The tutorial (Fig. 8.3) walks you through a Tātai game step by step, highlighting important features along the way.

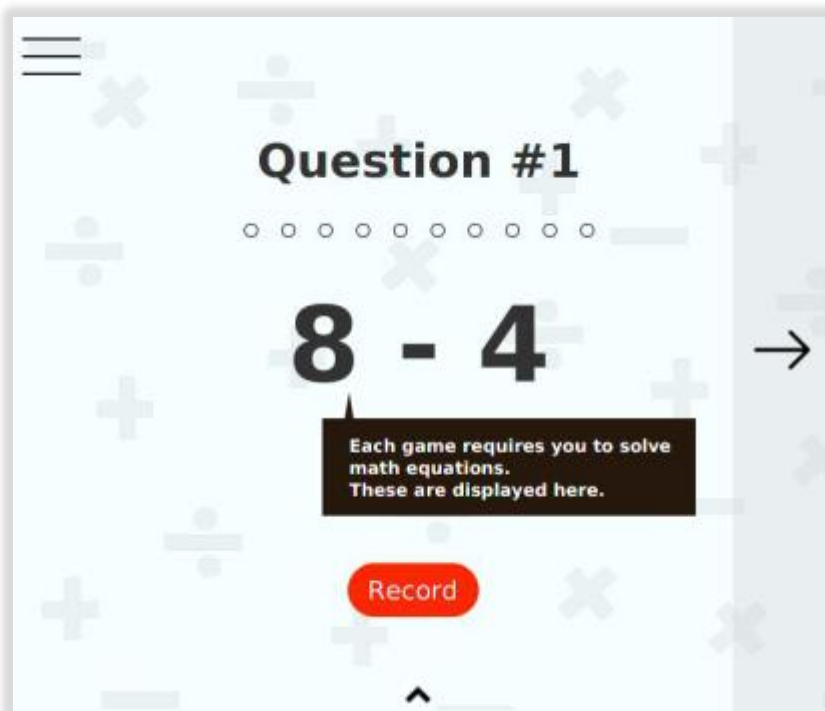


Figure 8.3: Tutorial

Hovering over these will give you helpful hints on how to use the program and will hopefully resolve any confusion you may have (shown in Fig. 8.2).

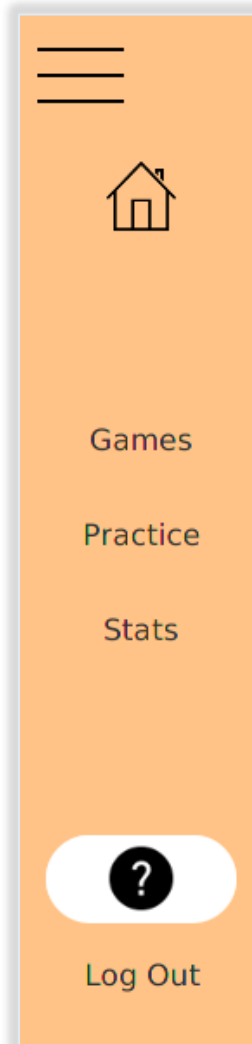


Figure 8.4: Help from the navigation bar