

ΛΒΛΛΚΥ ΕΔΥ

APP MANUAL

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**Legend**

Navigation in app



Useful tip

# 1 Basic Info

Abaku Education app is a complex application **for student and their teachers** providing a tool for teaching maths using Abaku method. As a teacher, you are able to prepare exercises for your students in it, participate on their solutions, and watch and track both the activity and the results of their effort. The students are then able to solve the assigned exercises as well as play classic Abaku games. It's actually two apps in one - games and exercises.

## 1.1 Technical Specification

**Platforms:** **Web** (Chrome 48+, Firefox 48+, Edge 38+, Internet Explorer 11)  
**Android** (4.1+)  
**iOS** (8+)  
**Windows** (8.1+)

**Devices:** PC/MAC, Tablet (at least 7")

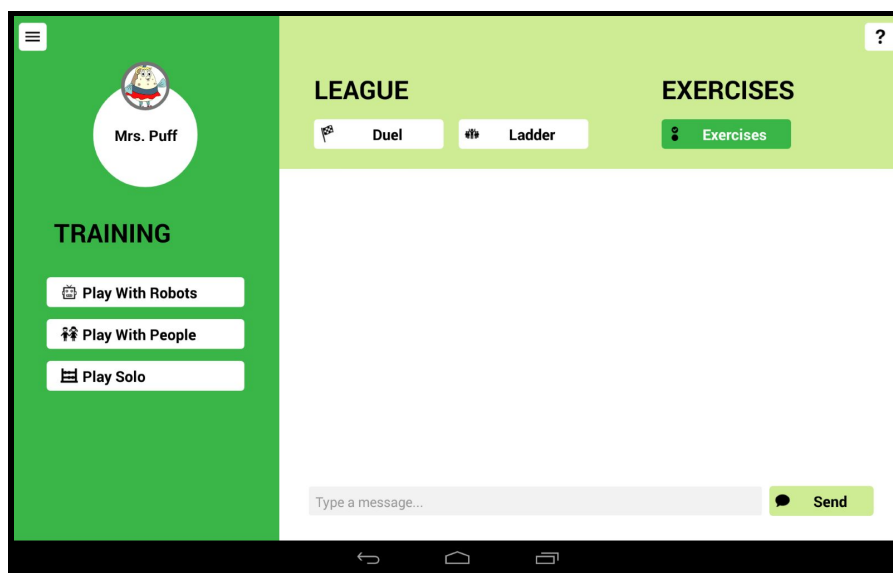
**Users:** Students (6-15) and their teachers

**Languages:** Czech and English

## 2 Main Screen and Menu

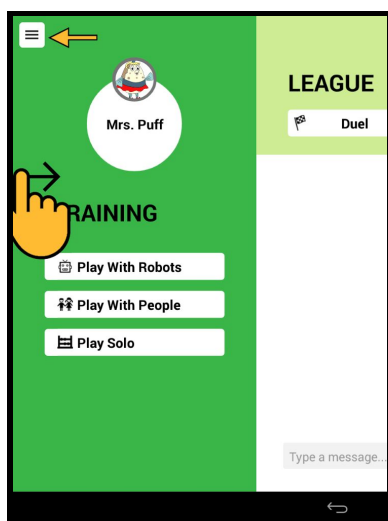
Before we go any deeper, let's describe the main screen and menu of the app a bit, since we will mention it several times throughout the following lines.

**Main screen** is what you see after a successful login and it is going to look quite similar as you can see below. From this screen you can easily get to both games and exercises.

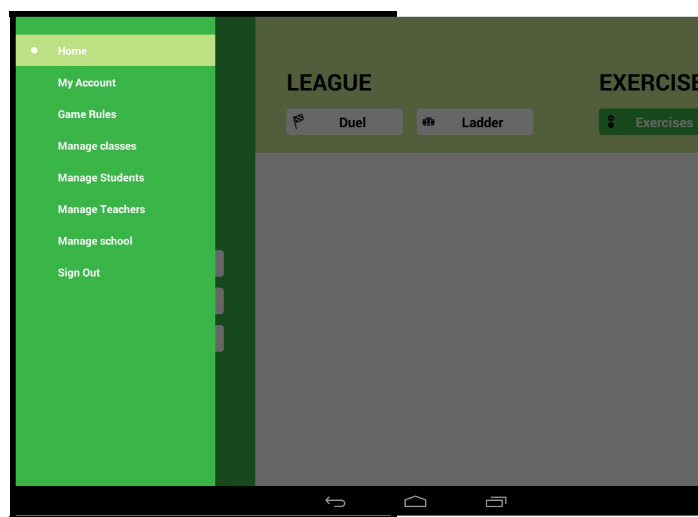


*Hlavní obrazovka*

The main menu is the second important part of the app. You can access it either by tapping the icon in the top left side of the screen or swipe from the left edge to the center of the screen.



*Access to menu*



*Main menu visible*

## 3 Users

### 3.1 Registration and Login of Schools, Teachers and Students

User cannot register to the app themselves. After purchasing the license an Abaku administrator creates:

- **School account** - everything you create in your school account is visible only to the users registered with your school. None of the data is public.
- **Admin account** - this will be the first user in your schools and is then able to register other Teacher, Students etc.

After the first admin account is created, the admin receives an email with instructions how to finish the registration process and from this point on the whole administration of your schools is in your hands or rather in the hands of you admins. The admin can then begin to add other Teacher and Students.

It is important to mention that for registration of any user a **valid email address** must be used.

User can have any of the following three roles and what is each role capable of is shown in the table below.

	Admin	Teacher	Student
Playing games	✓	✓	✓
Creating exercises	✓	✓	
Solving exercises			✓
Classes management	✓	✓	
Students management	✓	✓	
School management	✓		
Teachers management	✓		

### 3.2 Forgotten Passwords

If you forget your password, don't give up. The easiest way to reset it is to use "Forgot your password?" option on the login screen.

If any of the Students or Teachers forgets their password, you can change it for them by editing their profiles as long as you are Admin of Teacher (can change Students' passwords only).

### 3.3 Admins

Admin is a role of the first user registered with your school. It is therefore the chief person responsible for management of your school account. You can have as many admins as you like and as an admin you are basically a Teacher who is permitted to manage other Teachers and school account. Also do not forget your school have to have at least one admin.

#### 3.3.1 School Management

☰ *Menu* → *Manage School*

As admins, you are able to change basic information about your school like its name, address and other significant data.

#### 3.3.2 Teacher and Admin Management

☰ *Menu* → *Manage Teachers*

Admins are basically Teachers with exception that they are able to manage other Teachers i.e. creating them or setting Teachers to be admins. Such permission can be revoked anytime later.



*Mind who you set as an admin. Such user will have full management access as you do.*

#### 3.3.3 Managing Classes and Students

Admins are able to manage Students and classes the same way as Teacher do.

For further information see chapters [Class Management](#) a [Student Management](#).

#### 3.3.4 Exercises

See standalone document *Abaku Education - Exercises Manual*.

### 3.4 Teachers

As a Teacher, primary focus of your work will be the Students. You are to be their guides and advisors during playing the games and you can also create and assign them Abaku exercises. And naturally, Teachers are able play the games as Students do.



*Feel free to play also with your colleagues or with your students. Even you are able to join the school league. But consider what will the students say about that.*

#### 3.4.1 Class Management

Before you start registering the Students, it is necessary to set up classes for them. For creating your first class navigate **☰ Menu** → *Manage Classes* → *Add* → *Enter class name* → *Create*.

Once the class is created, you will you will be able to tap it and add Students to it.

#### 3.4.2 Student Management

**☰ Menu** → *Manage Students*

Now is the time to register your Students. Keep in mind that the **Students cannot register themselves** and that you are eligible to do it. This is all for practical reasons that you have clear overview of who exactly is registered with your school and who is not.



*With regard to the fact that personal data will be processed during registration, we recommend you to have got children's personal data processing consents covered.*

You can add new student in two consequently identical ways:

1. **☰ Menu** → *Manage Classes* → *Select a class* → *Add Student*
2. **☰ Menu** → *Manage Students* → *Add*

A **valid email address** will be used as student's login. As soon as you register new student, said student will receive an email with instructions, how to complete the the registration process. They will especially have to set their password for logging in.

You can then manage the student as you like. You can **edit** his personal data, including password or email address, or you can even **archive** the student. Archivation comes in handy especially in situations when such student does not attend your school anymore and archivation guarantees that other Students will not see the archived student in any list, but you as Teacher or admins can look them up via **☰ Menu** → *Manage Students* → *Show archived*.



### 3.5 Students

Students are added (or rather registered) by the Teachers or Admins. Students have no permission to manage other users.

Primarily, they can:

- Change their profile - see [User Profile](#) chapter.
- Play games - see [Games](#) chapter.
- Solve exercises - see standalone document *Abaku Education - Exercises Manual*

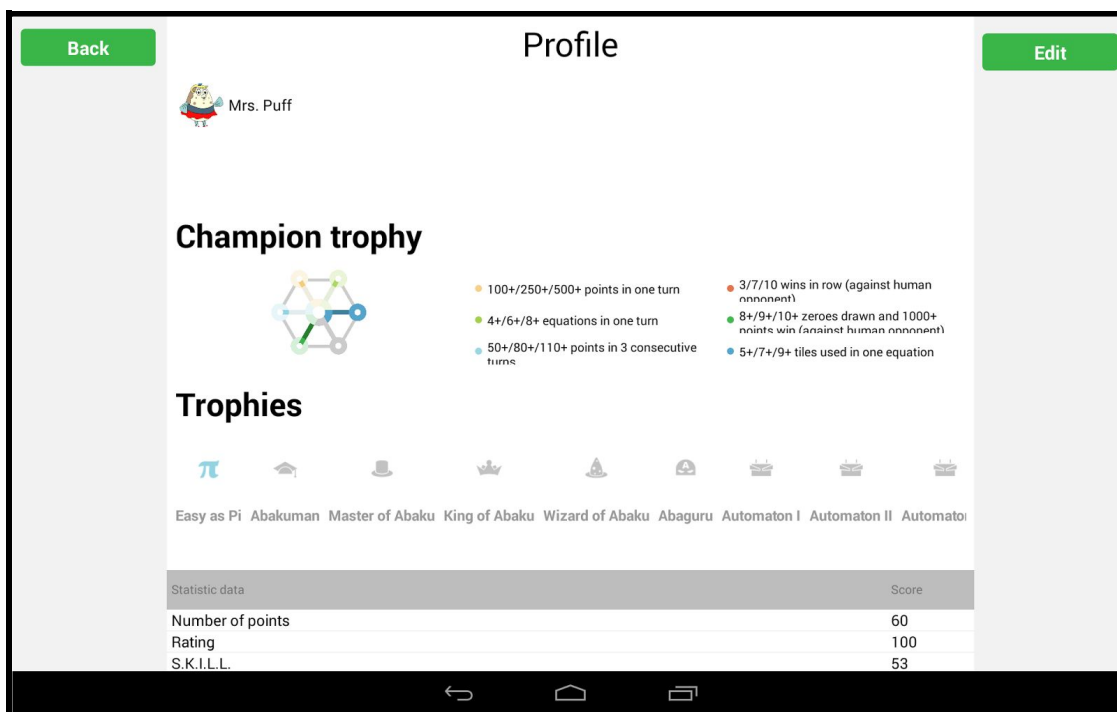
### 3.6 User Profile

**Detail:** ☰ Main screen → tap on the profile picture with name

**Edit:** ☰ Menu → My Account, či ☰ Profile detail → Edit

Every user, no matter whether Student or Teacher, have their own user profile and can change their name, nickname, profile photo, login credentials etc.

In your profile, you can also see the list of [Trophies](#) achieved and your [Statistics](#).



User profile

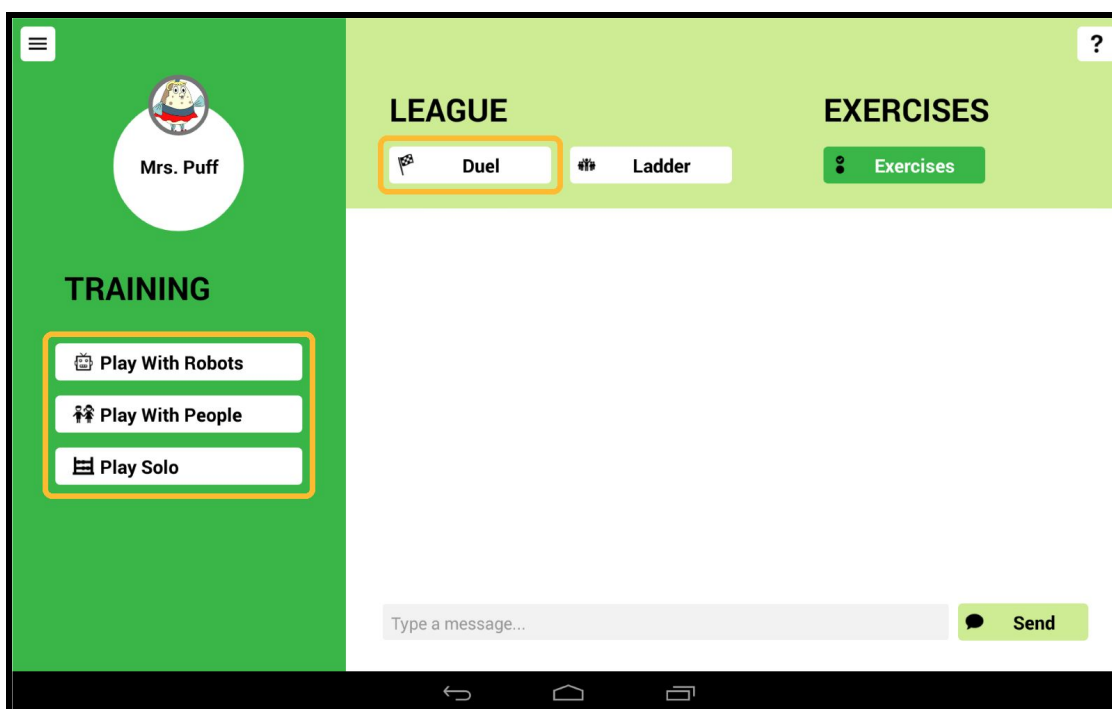
## 4 Games

Abaku game is inherent part of the Abaku universe and there is integral to our app.

If you have never played classic Abaku game, we recommend to first get familiar with the rules (see standalone document Abaku Game Rules) and play a few games for yourselves. After playing some more you will surely not be able to quit it.

### 4.1 Game Types

There are three or rather four types of Abaku game. It is league or training **match with live opponent**, **match with robot** and **solo game**. You can run all game types from the main screen and we will go through all of them one by one.



*Highlighted game buttons*

### 4.1.1 With Robots



*Playing with robot is a great choice for everybody who indulge in playing alone against the computer.*

At this moment, there are **three robots** available with different skill levels against which you can play. Each robot has certain limits to which it sticks - e.g. operations available, approximate final score, digits limits etc.

The following table shows the limits of each robot and **number of letters represents number of digits**. E.g.  $aa + a$  means that the robot can add two-digits numbers with one-digit numbers. Furthermore in the brackets, you can see to which numbers is the operand limited, e.g.  $dd : d[1,2,3]$  means that the divider can be only number 1, 2 or 3.

	Robot 1	Robot 2 (additionally)	Robot 3 (additionally)
<b>Addition</b>	$a + a$ $aa + a$ $a + aa$ $aa + aa$	$aaa + a$ $a + aaa$ $aaa + aa$ $aa + aaa$	No limits
<b>Subtraction</b>	$s - s$ $ss - s$ $ss - ss$	$sss - s$ $sss - ss$ $sss - sss$	No limits
<b>Multiplication</b>	$m \cdot m$ $m[1,2,3] \cdot mm$ $mm \cdot nm[1,2,3]$	$mm \cdot mm[\leq 20]$ $mm \cdot mm[30,40,50\dots 90]$ $m[1,2] \cdot mmm$	No limits
<b>Division</b>	$d : d$ $dd : d[1,2,3]$	$dd : dd[\leq 20]$ $dd : dd[30,40,50\dots 90]$ $ddd : d[1,2]$	No limits
<b>Square</b>	-	-	$x[\leq 20]^2$
<b>Square root</b>	-	-	$\sqrt[3]{x} \leq 20$
<b>Cube</b>	-	-	$x[\leq 20]^3$
<b>Cube root</b>	-	-	$\sqrt[3]{x} \leq 20$
<b>Final score</b>	$\pm 300-500$	$\pm 500-800$	$\pm 800-1100$

Playing against robots provides a unique chance to play stressless and train with no need of live opponent. Robots can also be easily used even for educational purposes. Due to their balanced scale of skills robots are also suitable for first-contact players. The student is not threatened by a possible loss against a friend and only few games are necessary for them to beat Robot 1.

#### 4.1.2 With People

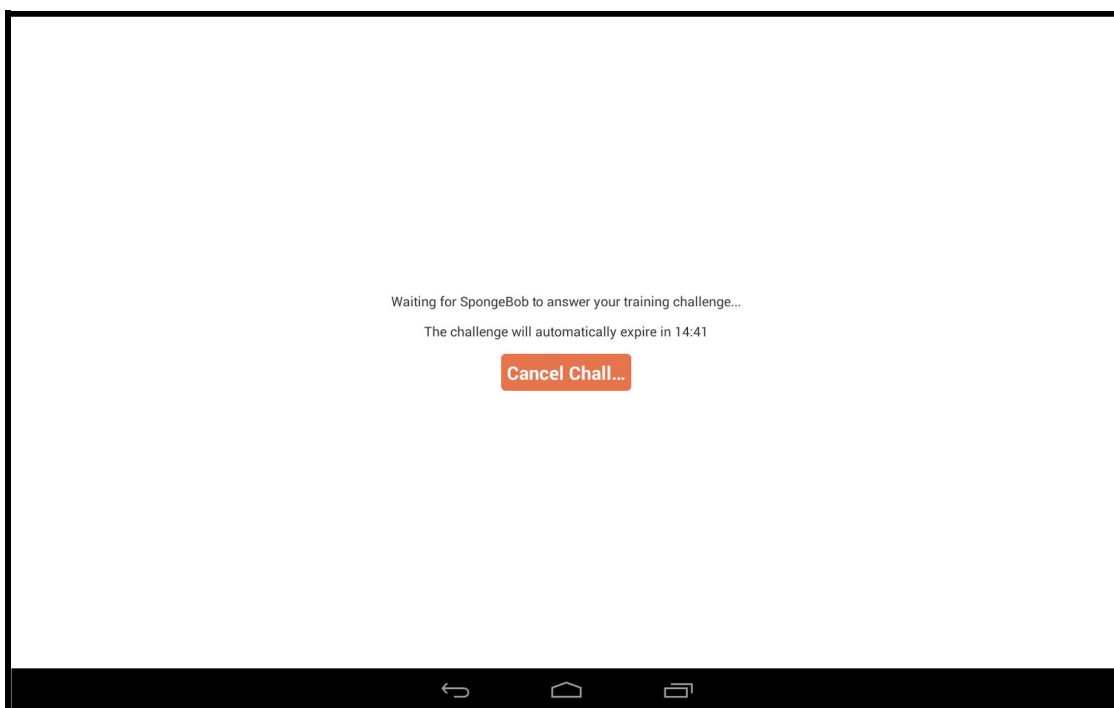
Playing against other people is the funniest, but at the same time the most demanding type of playing Abaku while advancing your skill the best way there is. One player can challenge another no matter whether it is a Student or Teacher, but only from the same school.

While playing with live opponent we distinguish two game modes - **league match** or **training match**. The only difference between them is that after playing league match the result of the match counts in the personal statistics and into the league ladder to which you can access from main screen.

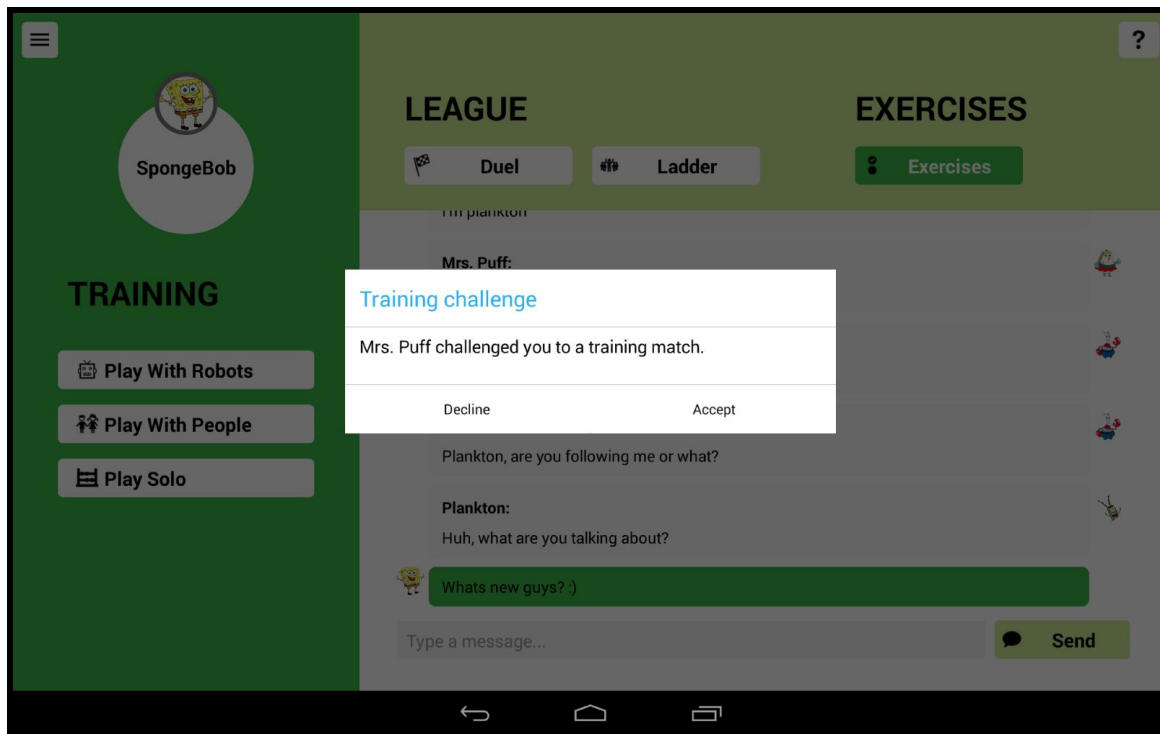
After selecting playing against live opponent the list of player is shown where the player can select who to challenge. The opponents is then notified that he or she have been challenged to a duel and is able to accept or decline the challenge. After acceptance both players are connected and the duel may commence.



*Keep in mind that not every student likes confrontation with live opponent.*



*Player awaits for opponent's acceptance*



*The opponent may accept or decline the challenge*

#### 4.1.3 Playing Solo

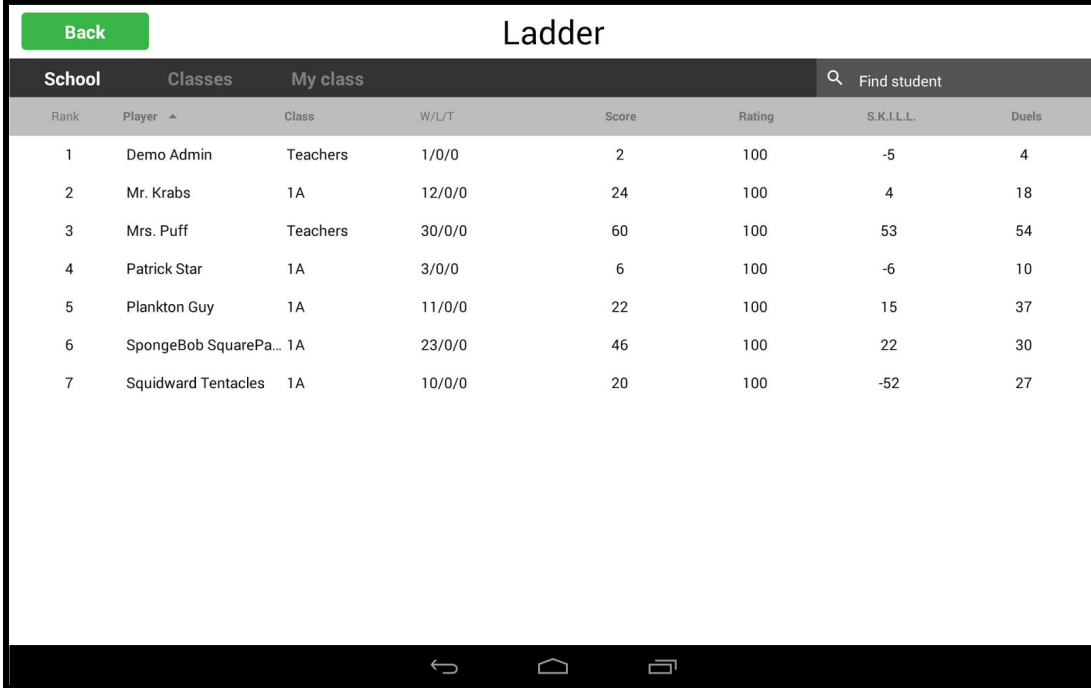
Play solo offer unique possibility to try Abaku game with no interruption, no time limit and no stress. In this game type, player has no opponent and can place all the tiles alone. The fact that there is no time limit allows the players to play at their own pace and figure out and learn, how to place the tiles, how to work with their racks, how to exchange the tiles, how to use the history and statistics, how the bonus fields work etc.



*Playing solo is the best choice for the beginners.*

## 4.2 Ladder

The ladder, which is accessible from the main screen, is directly bound to the school league. The results of **league matches** against live opponents are counted in this ladder and students can compare themselves with other players in their school or in their classes.



The screenshot shows a mobile application interface titled 'Ladder'. At the top left is a green 'Back' button. Below the title are three tabs: 'School', 'Classes', and 'My class'. To the right of these tabs is a search bar labeled 'Find student'. The main content is a table with the following columns: Rank, Player (with a dropdown arrow), Class, W/L/T, Score, Rating, S.K.I.L.L., and Duels. The table lists seven entries, with the top player being 'Demo Admin' in the 'Teachers' class.

Rank	Player	Class	W/L/T	Score	Rating	S.K.I.L.L.	Duels
1	Demo Admin	Teachers	1/0/0	2	100	-5	4
2	Mr. Krabs	1A	12/0/0	24	100	4	18
3	Mrs. Puff	Teachers	30/0/0	60	100	53	54
4	Patrick Star	1A	3/0/0	6	100	-6	10
5	Plankton Guy	1A	11/0/0	22	100	15	37
6	SpongeBob SquarePa...	1A	23/0/0	46	100	22	30
7	Squidward Tentacles	1A	10/0/0	20	100	-52	27

*Example of a ladder*



*Even teachers can join the school league. But consider how the students will react to it.*

## 4.3 Statistics

Personal and detailed statistics are part of every user's profile. That means you can see, how many games have you played, what was your best turn, what is a value of your average turn etc. Bear in mind that **only league matches** are counted in for now.

Apart from the detailed statistics you can also check three let's say comprehensive parameters or values i.e. **Number of points**, **Rating** and **S.K.I.L.L.**, which indicates how good the player actually is. Yet each one of them provides different point of view.

### 4.3.1 Number of Points

Number of points is a **simple rating system** similar to some sport where player gains 2 points for win, 1 point for tie and 0 point for loss.

### 4.3.2 Rating

Calculating Rating requires a **complex algorithm** adapted from Go game and its biggest advantage is that it takes into account how strong your opponent is. In plain words, every player starts with a Rating of 400. If you win, your Rating increases and vice versa. By how much the Rating actually increases or decreases depends solely on the difference between your and opponent's Rating.

If the winner had much higher Rating before the match (e.g. 600 vs 300), his or her Rating does not increase by much. But on the other hand, if the winner had much lower Rating before the game (e.g. 300 vs 600), his or her Rating increases significantly. In other words:

- The stronger opponent you defeat the more your Rating increases.
- The stronger opponent you lose to the less your Rating decreases.

See detailed description of [Rating Calculation](#) at the end of this manual.



*The biggest advantage of Rating is that it takes into account how strong your opponent is.*

### 4.3.3 S.K.I.L.L.

S.K.I.L.L.\* is our very own rating system which is **designed especially for the needs of Abaku**. After the match, both players get certain number of points depending on how well they played. The final number includes e.g. your final score, your best turn, your average turn time etc.

If you, for instance, end with final score higher than 400 points you get 1 point, and if your best turn is between 200 and 299 point you get another 2 points etc.

See detailed description of [S.K.I.L.L. Calculation](#) at the end of this manual.



*The biggest advantage of S.K.I.L.L. is that it is tailored to the needs of Abaku.*

\* S.K.I.L.L. means **S**trategic **S**pirit, **K**ing of **C**ombinations, **I**nvincible **I**ntelligence, **L**ove for **L**ogic, **L**earning by **L**osing

## 4.4 Trophies

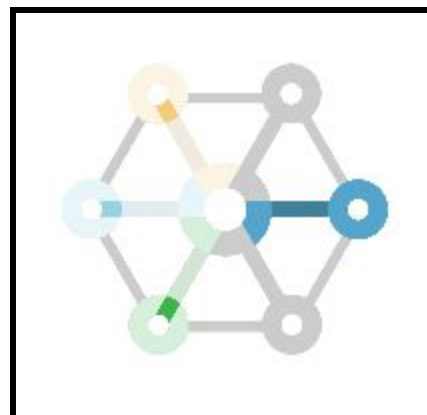
You can collect many trophies while playing Abaku game. Keep in mind here that you can collect new trophies **only while playing with live opponents of with robots**. If a new trophy is obtained, you will see it at match result screen properly highlighted. You can see all the trophies one can collect in the following table.

	Condition
<b>With people or robots</b>	
<b>Easy as Pie</b>	Player successfully plays 314 i.e. Pi number combination. Usually first collected trophy.
<b>With people only</b>	
<b>Abakuman</b>	Player achieves 2000+ points.
<b>Master of Abaku</b>	Player achieves 2000+ points 3 times not necessarily in consecutive order.
<b>King of Abaku</b>	Player achieves 2000+ points 9 times not necessarily in consecutive order.
<b>Wizard of Abaku</b>	Player achieves 2000+ points 27 times not necessarily in consecutive order.
<b>Abaguru</b>	Player achieves 2000+ points 81 times not necessarily in consecutive order.
<b>With robots only</b>	
<b>Automaton I. (II. a III.)</b>	Player defeats Robot 1 more than 10/30/50 times not necessarily in consecutive order.
<b>Bot I. (II. a III.)</b>	Player defeats Robot 2 more than 10/30/50 times not necessarily in consecutive order.
<b>Cyborg I. (II. a III.)</b>	Player defeats Robot 3 more than 10/30/50 times not necessarily in consecutive order.



### 4.4.1 Champion trophy

Champion trophy is an aggregated game trophy that depicts what have the player achieved so far. It is like a jigsaw puzzle which reflect the advancements and milestones the player met. As with other trophies you can assemble Champion trophy **only** while playing **with live opponent or robot**.



It consists of 6 keys, which are gradually completed only to unlock the whole trophy. Each key further consists of three parts which the player must collect. See the full list of the keys and conditions player have to met to get them.

Key	Colour	Condition
1	Gold	Player gains 100+/250+/500+ points in one turn.
2	Light green	Player makes 4+/6+/8+ equations in one turn.
3	Light blue	Player gains 50+/80+/110+ points in three consecutive turns.
4	Red	Player wins 3x/7x/10x in row against live opponent.
5	Dark green	Player gains more than 2000 points 27x against live opponent. <sup>1</sup>
6	Dark blue	Player gains more than 2000 points 81x against live opponent. <sup>1</sup>

<sup>1</sup> Wins does not need to be consecutive.

Following rules applies to champion trophy:

- Keys can be collected in no particular order.
- On the other hand particular parts of the key must be strictly completed in order. This rule stands also even in situation when the player meets all three conditions at once. E.g. if a player with empty Key 1 gains 500 points in one turn, only first part of the key is gained because so far only first consecutive condition was met i.e. scoring more than 100 points in one turn.
- Keys and their parts can be completed simultaneously. E.g. if a player gains 100 points in one turn which also consists of 5 equations, first parts of first and second keys are completed.

## 4.5 Chat

Chatting is available in two places in the app. First, you can see chat at the main screen. This is your school's public chat where everybody can post messages.

Second, there is in-game chat for the players. This is exclusively chat between the opponents and no one apart from that can see it.



*When you click somebody's profile picture in the public chat you can see their profile.*

## 5 Attachments

### 5.1 Rating Calculation

Each new player has Rating of 400.

Before every match we calculate probability of a win of player A (weaker) and player B (stronger). Base on such value we calculate final rating adjustments after a finished match.

$$S_{EA} = 1 / (e^{((R_B - R_A) / (205 - 0.05 * R_A))} + 1) - 0.008$$

Probability of win of a stronger player is calculated:

$$S_{EB} = 1 - S_{EA} - 0.016$$

Where:

$R_A$  - current rating of player A

$R_B$  - current rating of player B

$e$  - Euler's number

New rating is then calculated for each player:

$$R_{new} = R_{old} + K * (S - S_E)$$

Přičemž:

$R_{new}$  - new rating of a player

$R_{old}$  - old rating of a player

$S$  - match result (1 for win; 0,5 for tie; 0 for loss)

$S_E$  - probability of win

If a value of  $R_{new}$  drops below 100, then  $R_{new} = 100$ .

Value of  $K$  is based on interpolation from the following table.

<b>R<sub>old</sub></b>	<b>K</b>
100	116
200	110
300	105
400	100
500	95
600	90
700	85
800	80
900	75
1000	70
1100	65
1200	60
1300	55
1400	51

<b>R<sub>old</sub></b>	<b>K</b>
1500	47
1600	43
1700	39
1800	35
1900	31
2000	27
2100	24
2200	21
2300	18
2400	15
2500	13
2600	11
2700	10

## 5.2 S.K.I.L.L. Calculation

After the end of every match all following points are totaled for each player.

### General

- (1 point) for finished match
- (2 points) for win or tie
- (-5 points) for ending the game
- (3 points) for no bad turns in the match

### Playing the zeros

- (1 point) for **losing** with 8 drawn zeros
- (2 points) for **losing** with 9 drawn zeros
- (3 points) for **losing** with 10 drawn zeros
- (4 points) for **losing** with 11 drawn zeros
  
- (1 point) for **winning** with 7 drawn zeros
- (2 points) for **winning** with 8 drawn zeros
- (3 points) for **winning** with 9 drawn zeros
- (4 points) for **winning** with 10 drawn zeros
- (5 points) for **winning** with 11 drawn zeros

### Score

- (1 point) for ending with 400+ points
- (2 points) for ending with 600+ points
- (3 points) for ending with 1000+ points
- (4 points) for ending with 1100+ points
- (5 points) for ending with 1500+ points
  
- (1 point) for best turn between 100 - 199 points
- (2 points) for best turn between 200 - 299 points
- (3 points) for best turn between 300 - 399 points
- (4 points) for best turn between 400 - 499 points
- (5 points) for best turn scoring 500+ points
  
- (1 point) for average number of 20 - 49 points per turn
- (2 points) for average number of 50 - 69 points per turn
- (3 points) for average number of 70 - 89 points per turn
- (4 points) for average number of 90 - 99 points per turn
- (5 points) for average number of more than 100 points per turn

### Tiles

- (1 point) for average number of 2 - 2.49 laid tiles per turn
- (2 points) for average number of 2.5 - 2.99 laid tiles per turn

- (3 points) for average number of 3 - 3.49 laid tiles per turn
- (4 points) for average number of 3.5 - 3.99 laid tiles per turn
- (5 points) for average number of more than 4 laid tiles per turn
  
- (1 point) for average number of 2 - 4.99 used tiles per turn
- (2 points) for average number of 5 - 6.99 used tiles per turn
- (3 points) for average number of 7 - 8.89 used tiles per turn
- (4 points) for average number of 9 - 9.99 used tiles per turn
- (5 points) for average number of more than 10 used tiles per turn

### Equations

- (1 point) for average number of 1.5 - 1.9 equations created per turn
- (2 points) for average number of 2 - 2.49 equations created per turn
- (3 points) for average number of 2.5 - 2.99 equations created per turn
- (4 points) for average number of 3 - 3.99 equations created per turn
- (5 points) for average number of more than 4 equations created per turn

### Bonuses

- (1 point) for using any bonus 7 - 11 times
- (2 points) for using any bonus 12 - 16 times
- (3 points) for using any bonus 17 - 19 times
- (4 points) for using any bonus 20 - 22 times
- (5 points) for using any bonus 23+ times

### Time

Time per turn (calculated as **Average time per turn - 8 seconds** for placing the tiles):

- (5 points) for 15 for 45 seconds at maximum
- (4 points) for 25 for 45 seconds at maximum
- (3 points) for 35 for 45 seconds at maximum
- (2 points) for 45 seconds at maximum
- (1 point) for 55 for 45 seconds at maximum

### One More Speciality

Following points are gained only by the **winner** if he or she draws a smaller number of tiles equally in two categories of numbers (7-9) and (4-6). This might a bit complicated to understand at first so let's see some examples below.

But first the points gain dependant on the difference in each category:

- (1 point) for having **3+/1+** less tiles in respective category
  - I.e. having less than **3+** tiles in **7-9 category** and also **1+** tile less in **4-6 category**
- (2 points) for having **5+/3+** less tiles in respective category
- (3 points) for having **7+/5+** less tiles in respective category
- (4 points) for having **9+/7+** less tiles in respective category
- (5 points) for having **11+/9+** less tiles in respective category

Obvious precondition is that there is 11 tiles of each number and therefore 33 tiles in each category (7-9 and 4-6).

### Algorithm

1. A number of tiles drawn of each category is summed up for the winner (**W**).
2. The same is done for the loser (**L**).
3. The differences between these numbers for each player in each category is calculated.
4. And finally, the rule to which the calculated values matche is applied.

### Example

1. **W** draws **10/14** tiles (10 tiles from 7-9 category and 14 tiles from 4-6 category)
2. **L** then consequently draws remaining **23/19** tiles (23 from 7-9 category and 19 from 4-6 category)
3. The difference from the point of view of the **W** is 13/5 so then during the game **L** drew:
  - a. **13** less tiles in 7-9 category and
  - b. **5** less tiles in 4-6 category so
  - c. **Final differences are 13 and 5** (or 13/5 in abbreviated form)
4. Even though having more than 11 tiles less in 7-9 category which meets condition 1, the **W** have only 5 tiles less in 4-6 category and as such meets only condition for **gaining 3 points**.
  - a. I.e. has 7 tiles less in 7-9 category and 5 tiles less in 4-6 category

### Other examples

1. If the final differences are **5/3**, winner gains **2 points**.
2. If the final differences are **3/5**, winner gains **1 point**.
3. If the final differences are **3/7**, winner gains **1 point**.
4. If the final differences are **7/7**, winner gains **3 points**.
5. If the final differences are **21/1**, winner gains **1 point**.
6. If the final differences are **1/21**, winner gains **0 points**.
7. If the final differences are **-1/3** (i.e. winner drew 1 tile more from 7-9 category), winner gains **0 points**. 0 points is gained every time when the winner draws more tiles in either of two categories than the opponent.

## 6 Help and support



*Abaku stands on shoulders of zealous students and bold teachers and we still want it to be this way. So feel free to contact us should any **idea or suggestion** occur concerning either our app or generally Abaku.*

Congratulations, you have read it all. If you are still bit uncertain about something we are here to help and you have several options how to proceed:

1. **Read the Help** - There is help button present at many screens in the app. If you don't know how to work with exercises, just go to exercises and tap on the help button.
2. **Read App Manual** - That's the one you are currently reading. Read it carefully, it will definitely help you.
3. **Read Exercises Manual** - Although the exercises are integral part of the app they deserve a dedicated document. You will find detailed description of how to work with Abaku exercises, how to create them, assign them, assess them and many more.
4. **Read Game Rules** - Understanding the basic concept of Abaku, i.e. teaching arithmetics without aid of visible symbols, is the cornerstone for both exercises and games. The Abaku game is a big chapter in the Abaku universe and you can see the rules of it in dedicated document.
5. **Read Abaku Methodology** - Support of the teachers is a crucial for us and is crucial part of Abaku Education. Teachers can learn how to include and incorporate Abaku in their classes in our latest publication about Abaku methodology, where they can especially find systematically prepared content for the classes including worksheets.
6. **Contact us** - If you still haven't found the answer you've been looking for, nothing easier than to contact us. We like to talk and we'd like to be helpful.



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