

**National Educational Robotics Competition 2025**

# BaSTEMball

**Game description and rules**



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## A. Brief Description of the Game

BaSTEMball is an exciting team game for primary school students. It is a basketball match, where 2 rival alliances, consisting of 2 teams each, try to move with their remote-controlled robots as fast as they can and shoot from specific positions of the court (basketball track on a specially designed table). Each alliance's goal is to win the game by scoring more baskets than their opponents as fast as they can.

## B. Participants

- **Ages:** (E' – Sixth Grade born from 1/1/2013 to 31/12/2014)
- **Persons per group:** 3 children (minimum 2 and maximum 3)
- **Coach** (over 20 years old)

## C. Educational objectives

Educational Robotics is an extremely valuable learning tool, which enhances the acquisition of basic skills that are necessary in modern times. Students who undertake to complete various tests through Educational Robotics develop problem-solving skills, cultivate their creativity, take initiatives, experiment with different solutions and generate innovative ideas. One of the main characteristics of Educational Robotics is its ability to combine diverse fields of knowledge in a unique way, allowing students to integrate and apply in practice theoretical knowledge acquired from Mathematics, algorithms, programming, engineering and Natural Sciences.

Educational Robotics offers an important contribution to the educational process, as it combines learning with entertainment through playful learning. At the same time, it promotes collaboration as students learn to work in teams, and enhances experiential and physical learning.

The Basteball competition, designed based on the principles of Educational Robotics, provides an excellent opportunity for the practical application of these pedagogical principles. Specifically, its pedagogical value is summarized in the following points:

1. It provides a smooth introduction to the world of Educational Robotics, utilizing the popular sport of basketball. The main goal is to form a positive attitude towards Educational Robotics and demystify it, which is achieved through the use of a simple robot with minimal equipment and programming.

2. It ensures that construction and programming are the result of students' personal work, since the requirements in construction skills and programming knowledge are simple. This allows primary school students to respond, without requiring complicated connections or algorithms. The requirements of the competition fall within the content of the curricula.
3. Readiness, decision-making and initiative, as skills that a student must cultivate, are present throughout the game - and not only during the preparation before the match -, sharpening the perception of the participants, maintaining undiminished interest and creating a pleasant atmosphere of action, full of surprises and emotions.
4. The competition offers the opportunity to create a climate of cooperation and teamwork through communication between teams, which nowadays is a key component of creativity and promotes the spirit of fair play.

#### D. General Principles of Gambling

According to the educational objectives, the following general principles should be mandatorily applied:

1. Robots should be built and programmed solely by students.
2. As in real basketball, the referees' decisions are final. The result of a match cannot be changed unless a mistake has been made in the score measurement.
3. Students and their coaches should cooperate in such a way that the educational objectives of the game are not violated. Both should also help to ensure the smooth running of the games.
4. What matters most is not the win or the loss, but the participation itself and the thrills of a basketball match.
5. The organizing committee has the right, at its discretion, to expel a team from the competition if it finds that it is attempting to use unfair means contrary to the spirit of healthy competition on equal terms not expressly provided for in these rules.
6. The rules of the game may be modified by decision of the league officials and the organizing committee before the start of the tournament and announced to the players, in order to maintain the pedagogical spirit and the smooth conduct of the matches. They also have the right to:

They instruct the judges to intervene on the dance floor or baskets in case they are damaged or moved.

## E. BaSTEMball Rules

### 1. Group of students

- 1.1. Each group of students taking part in the competition will have to build and program only **one** robot.
- 1.2. It is forbidden to replace a robot for any reason. Teams that replace one of their robots during the games are eliminated from the tournament.
- 1.3. Each team can consist of only 2 or 3 students and a coach. Students are required to share roles to ensure everyone is involved during the game.

### 2. Group Alliances

- 2.1. An alliance consists of 2 groups of students
- 2.2. In each match, 2 rival alliances collide.
- 2.3. Before each match, alliances will be given time to discuss and define their in-game strategy.

### 3. Scoring

- 3.1. Scoring is achieved when the ball passes the entire hoop of the basket that the team is attacking.
- 3.2. To count the basket, the ball must not hit the court, even if it ends up inside the hoop.
- 3.3. There is no own basket if one alliance scores on the other basket.
- 3.4. The alliance that scores the most made baskets wins the game.
- 3.5. Each robot must shoot from specific positions on its side of the field. He is only entitled to one shot from each position.
- 3.6. Depending on the position, baskets count for 3.2, and 1 point, as in regular basketball.
- 3.7. The seventh shot is necessarily made from the three-pointer behind the shots.
- 3.8. The "fire shot" is made from the three-pointer behind the shots and counts for 5 points.

#### 4. Race Duration

- 4.1. The match has a total duration of 4 minutes.
- 4.2. There is no half-time. Teams keep the same movement space.
- 4.3. During the race, time flies continuously, without stopping the clock at all.
- 4.4. The game stops with the expiration of time or when both alliances have completed their respective shots.
- 4.5. When teams aren't racing, they have the ability to repair and reprogram their robots.

#### 5. Racing Action

- 5.1. At the start of the match, 15 balls are placed in the space located in the center of the field. All robots should be placed in the squares of the center, on the side where their alliance robot is located, and put into operation.
- 5.2. The match starts by order of the referee.
- 5.3. At the start, each player takes a ball and loads it into his robot. Then the robots must head to the front line located in the position of free throws. He immobilizes his robot so that the front view is either further back or at most touching, but does not exceed the black line parallel to the free throw line. The referee, as soon as he is sure of the correct positioning, gives permission for the shot, raising his hand and pointing with his fingers to the number 1.
- 5.4. If the ball goes into a basket the point is counted, if not, the ball is removed from the track. If the ball during the shot does not touch any part of the board or hoop, then it is placed again in the center, so that the robot can pick it up again, going to its starting point, to repeat the same shot.
- 5.5. Once the process is completed from the shooting position, each robot returns to its starting point to get another ball and try from the two-point position. Again the referee gives permission for a shot with his hand pointing to 2, since the robot has stopped with its front projection either further back or at most touching the line to the side of the basket. Rule 5.4 also applies here.
- 5.6. Once the process is completed with the position of the two-pointer, each robot returns to its starting point, to get another ball and try from the position of the three-pointer, each from a different angle. Again the referee

He gives permission for a shot with his hand pointing to 3, since the robot has been immobilized with its front projection either further back or at most touching the line to the side of the basket, behind the white line of the three-pointer. Rule 5.4 also applies here.

- 5.7. Once all attempts from the six total positions are completed, the alliance decides which robot will get the extra ball to shoot from the three-point line behind the shots. The procedure applies by placing the robot either further back or at most touching the line facing the basket. Rule 5.4 also applies here.
- 5.8. The alliance that will finish all 7 attempts must place all 2 of its robots in the starting boxes. The team that makes it first has the right to take the last ball and decide which robot will shoot the "fire shot" from the three-point box behind the shots. Here, too, the robot must either be further back or at most touch the three-point line. Rule 5.4 also applies here. The process of "shooting fire" is included in the duration of the game.
- 5.9. When the time expires, the game stops and no other action is allowed.
- 5.10. If at the end of the time a robot makes a shot, this will be considered timely, if the referee judges that the ball had left the robot and was heading towards the basket.
- 5.11. Players are not allowed to touch their robots during the match, except with permission from the referee. If any robots get stuck together, then the referee can tell them apart, moving them as little as possible.
- 5.12. It is forbidden for a robot to intercept the opponent or cross the center line and enter the opponents' area. If this happens, an infringement is charged and **the alliance team is penalized with a penalty of -5 points.**
- 5.13. Robots can freely touch or cross the lateral end lines during movement and alignment in order to shoot.
- 5.14. In case players do not follow the order of shots or shoot from another position, they do not get points, even if they score. The balls are placed back in the center of the field and the robots start the process from where they left off.

## 6. Damaged Robots

- 6.1. A robot will be marked "**damaged**" by the referee when:
  - some part of it has been dismantled,
  - remains stationary (lost communication with controller)
  - If the alliance wants for any reason to take one of its own robots out of the race.
- 6.2. A "damaged" robot remains off the field until the repair is completed by the students. Immediately afterwards and after permission has been given by the referee, he returns to the match. The robot that returns to the match is placed on the starting line and continues shooting from where it left off.
- 6.3. If a robot flips over for any reason, with the help of the referee it gets up again and continues the game.
- 6.4. If both robots from an alliance are classified as "damaged" and exit the game, the race proceeds normally. The timer is interrupted when all four robots are destroyed and resumes when even one robot returns to the field.
- 6.5. If during the recovery process the robots are damaged by the fault of the referee who untangles them, then the timer stops and the team is given time to repair the robot. In this case, no robot moves until the damaged robot returns to where it was. The timer starts again and the race continues normally.

## 7. Robot Specifications

- 7.1. Teams must use an **ELECFREAKS TPBot car kit** robot, an **ELECFREAKS 360 Degrees Building Blocks Servo engine** and up to 2 **Microbits**.
- 7.2. The robots will not be autonomous, but will be controlled remotely. Movement and shot control should be performed in one or a combination of the following ways:
  - A) with the **laptop keyboard** and Microbit connection software (e.g. **scratch/Mind+**).
  - B) with a second **Microbit board** in conjunction with a fully programmable **remote control** (e.g. ELECFREAKS micro:bit Joystick:bit). The Microbit is connected to the controller and then connected to the robot's Microbit via software (e.g. makecode).
- 7.3. Only materials included in LEGO packages or equivalent building materials packages may be used for the construction of robots.

- 7.4. Each robot must have a shooting mechanism, that is, a structure in the front (only) that pushes the ball to hit the basket.
- 7.5. **In each team, each player must make at least a move, get the ball and make a shot.**
- 7.6. It is forbidden to modify or alter the pieces.
- 7.7. For the assembly of robots it is not allowed to use other materials, such as adhesives, tapes, screws, etc.
- 7.8. It is possible to make pre-programmed moves in the program with Microbit.
- 7.9. Each robot should have dimensions that do not exceed **14 cm in length, 14 cm wide and 27 cm high.**
- 7.10. The dimensions of robots are measured when they are upright and have all their mobile parts fully open towards the front of the robot.
- 7.11. Motor cables are not counted in measuring dimensions.

## 8. Assembling Robots

- 8.1. Players should bring robots ready on the day of the competition.
- 8.2. Competing students should not use any kind of help, such as instructions or drawings on paper, photos stored on the computer, etc.
- 8.3. Competing students are allowed to use programs they have written earlier (before the day of the competition).
- 8.4. Students are allowed to modify their constructions or programs from the time they enter the competition area or in the space between races. That is, there will be no quarantine before or during the games.
- 8.5. It is the responsibility of the teams that their robots constantly meet all the specifications and restrictions set by the rules. If, after a race, a robot is found to be in breach of a rule, then the points earned in that race will be deducted from the alliance.

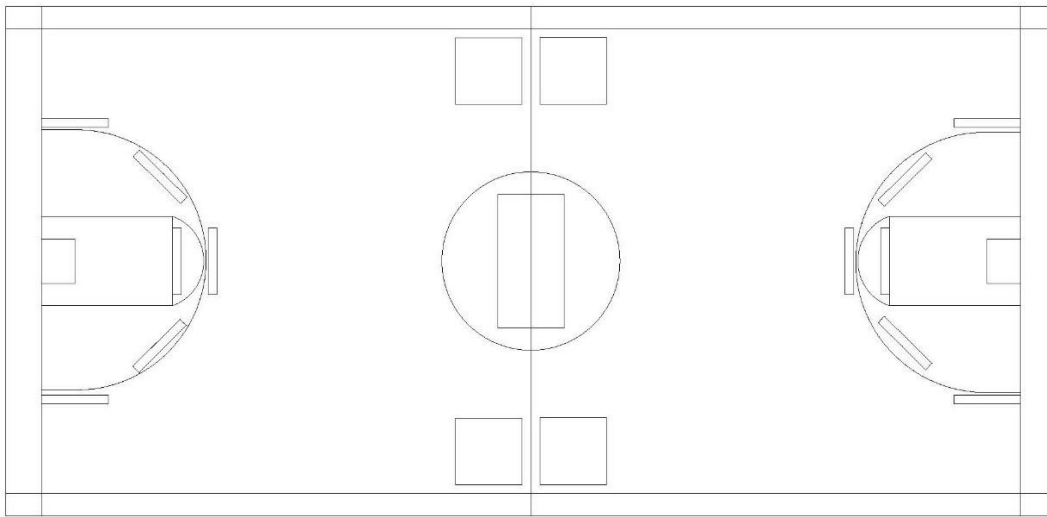
## 9. Tournament procedure

- 9.1. The tournament will be held in two phases: the preliminary and the final.
- 9.2. The qualifying phase will take place in 4 rounds. In each competitive round of this phase, alliances will be formed by random draws.
- 9.3. In each game the teams of the winning alliance will share 2 points each.



- 9.4. In games that end in a draw, the winner is the alliance that achieved the "shot fire". If this did not happen, the winner is the alliance that scored more three-pointers. If there is a tie there too, the winner is the alliance that scored the most three-pointers from the corners. Although there we have a draw, the winner is the fastest alliance, that is, the one that made a "shot fire". If the draw continues, they are shared by 1 point.
- 9.5. In the qualifying phase, teams are ranked on a single leaderboard.
- 9.6. In case of a tie in the table, the following criteria will apply in order of priority:
- Points difference
  - Number of points scored
  - The winner of the match between them
  - More Accurate Fire shots
  - Most (total won) Fire shots
  - Draw
- 9.7. The top 16 teams of the qualifying phase qualify for the final phase.
- 9.8. The alliances of the final phase are stable until the end of the tournament and arise as follows: The 1st team is allied with the 16th, the 2nd with the 15th, the 3rd with the 14th and so on.
- 9.9. The alliances compete in knockout games until the grand final.
- 9.10. In case a knockout match ends in a draw, the winner is the alliance that achieved the "shot fire". If this did not happen, the winner is the alliance that scored the most three-pointers. If there is a tie there too, the winner is the alliance that scored the most three-pointers from the corners. Although there we have a tie, the winner is the fastest alliance, that is, the one that carried out "shoot fire." If the tie continues, the teams make 1 alternate shots from the can to the place of shots. The alliance that scores wins the match at the expense of the one that misses.
- 9.11. The teams of the alliance that will win the tournament share the 1st place.
- 9.12. In case of withdrawal of a team, the game is played normally with the alliance competing with only one robot, which will shoot all 7 shots. The opposing alliance normally competes with its two teams.
- 9.13. In case both teams of the alliance withdraw, the opposing alliance wins the match with a score of 9-0 in their favor.

## 10. Basketball court and materials



- 10.1. The floor will be printed on canvas from a high resolution file that you will find on the Stem Education website.
- 10.2. The tarpaulin has dimensions: **2362 X 1143 mm**
- 10.3. The playing field is: **2202 X 1043 mm**
- 10.4. Basketball distances from three-point position: **300 mm**
- 10.5. Basketball distances from two-point position: **260 mm**
- 10.6. Basketball distances from shooting position: **220 mm**
- 10.7. The black lines have dimensions: length **150 mm** and thickness **20 mm**
- 10.8. The blue starting frames have dimensions: **150 x 150 mm**
- 10.9. The frame with the balls in the center has dimensions: **300 x 150 mm**
- 10.10. Ball: Elecbreaks balls (Diameter approx. **40 mm** and weight approx. **2.5 gr**)
- 10.11. Baskets have approximately the following dimensions:
  - Basketball mount height with backboard: **230 mm**
  - Basketball bracket height: **167 mm**
  - Dashboard dimensions: **150 X 80 mm**
  - Bezel diameter: **90 mm**
  - Rim height: **150 mm**
  - Basketball base: **100 X 75 mm**

F. Annex 1: Rubric

ALLIANCE A	B O L H	DIPO DO	TRIPO DO CORN ER	TRIPO DO TOP THE	<b>FIRE SHOT</b>	PO	TEAM TOTALS	ALLIANCE SCORE
	1	2	3	3	5	-5		
	1	2	3	3	5	-5		
ALLIANCE B								
	1	2	3	3	5	-5		
	1	2	3	3	5	-5		

