

# GENERAL RULES

VERSION: DECEMBER 1<sup>ST</sup> 2021



## ROBO SPORTS

TEAMS COMPETE  
WITH 2 ROBOTS IN  
AN EXCITING GAME

**AGE GROUP:**  
11-19

# WRO® 2022 DOUBLE TENNIS

WRO INTERNATIONAL PREMIUM PARTNER





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In addition, please note that during the season there might be clarifications or additions to the rules, which can be found in the official WRO Questions & Answers section of the WRO website. The answers are supplementary to the rules.

You can find the WRO 2022 Q&A on this page:

<https://wro-association.org/competition/questions-answers/>

### **IMPORTANT: Use of this document in national tournaments**

This rule document is made for all WRO events around the world. It is the basis for the judging at International WRO events. For the national competitions, a WRO National Organizer has the right to adapt these international rules to suit local circumstances. All teams participating in a national WRO competition should use the General Rules as provided by their National Organizer.



## 1. General information

### Introduction

In the WRO RoboSports category teams design robots that compete with robots of another team.

In a match two teams each have 2 robots on the field. The robots are coded to play the game autonomously and collaborate with each other where possible. The sport that is played by the robots changes every 2-3 years.

### Focus Areas

Every WRO category and game has a special focus on learning with robots. At the WRO Double Tennis Game, students will focus on developing in the following areas:

- More advanced coding skills (repeating algorithms for a good game play).
- Communication between robots and planning collaborative actions.
- Orientation of the robot on the field in an environment with other robots that move.
- General engineering skills (building robots that can push/shoot objects of certain sizes) and advanced kinematics (omni-directional robots).
- Strategy and tactics changing depending on the opponent's robot's behavior.
- Teamwork, communication, problem solving, creativity.

### Learning is most important

WRO wants to inspire students around the world into STEM-related subjects and we want the students to develop their skills through playful learning in our competitions. This is why the following aspects are key to all our competition programs:

- ❖ Teachers, parents or other adults can help, guide and inspire the team, but they are not allowed to build or code/program the robot.
- ❖ Teams, coaches and judges accept our WRO Guiding Principles and WRO Ethics Code to ensure a fair and rewarding competition for all.
- ❖ On the competition day it is down to the teams, coaches and judges together to deliver a fun and fair event.

More information on the WRO Ethics Code can be found here:

<https://wro-association.org/wp-content/uploads/2021/08/WRO-Guiding-Principles-and-Ethics-Code-2022.pdf>



## 2. Team and Age Groups definitions

- 2.1. A team consists of 2 or 3 students.
- 2.2. A team is guided by a coach.
- 2.3. 1 team member and 1 coach are not considered a team and cannot participate.
- 2.4. A team may only participate in one of the WRO categories in a season.
- 2.5. A student may only participate in one team.
- 2.6. The minimum age of a coach at an international event is 18 years old.
- 2.7. Coaches may work with more than one team.
- 2.8. The age group for this category is defined as students aged 11 up to 19 years. (In season 2022: born years 2003-2011)
- 2.9. The maximum age indicated represents the age that the participant turns in the calendar year of the competition, **not** his/her age on the competition day.

## 3. Responsibilities and team's own work

- 3.1. A team should play fair and be respectful towards teams, coaches, judges and competition organizers. By competing in WRO, teams and coaches accept the WRO Guiding Principles that can be found at: <https://wro-association.org/wp-content/uploads/2021/08/WRO-Guiding-Principles-and-Ethics-Code-2022.pdf>.
- 3.2. Every team and coach need to sign the WRO Ethics Code. The organizer of the competition will define how the Ethics Code is collected and signed.
- 3.3. The construction and coding of the robot may be done only by the team. The task of the coach is to accompany them, help them with organizational and logistical matters and support the team in the case of questions or problems. The coach cannot be involved in the construction and programming of the robot. This applies to both the day of the competition and the preparation.
- 3.4. A team is not allowed to communicate in any way with people outside of the competition area while the competition is running. If communication is necessary, they should ask the permission of a judge who may allow team members to communicate with others, under a judge's supervision.
- 3.5. Team members are not allowed to bring and use mobile (cell) phones or any other communication device into the competition area.
- 3.6. Any instructions to the robot to win the match can be provided only in form of the program. No data are allowed to be entered by interacting a team member/coach/people outside of the competition with the physical parts, sensors or other electronic components of the robot.
- 3.7. Destruction or tampering with competition courts/tables, materials, or the robots of other teams is prohibited.
- 3.8. It is not allowed to use a solution (hardware and / or software) that is (a.) the same or too similar to solutions sold or posted online or (b.) the same or too similar to another solution at the competition and clearly not the team's own work. This includes solutions from teams from the same institution and/or country.



- 3.9. If there is a suspicion in relation to rule 3.3 and 3.8, the team will be subjected to investigation and any of the consequences mentioned in 3.10 can apply. Where appropriate rule 3.10.2 may be used to prevent the team under investigation from progressing to the next competition stage, even if the team would win the competition stage where the potential rule breaking has been identified.
- 3.10. If any of the rules mentioned in this document are broken or violated, the judges can decide on one or more of the following consequences. Before a decision is reached, a team or individual team members may be interviewed to find out more about the possible violation of the rules. The interview can include questions about the robot or the program.
  - 3.10.1. A team may not be allowed to participate in a game and gets 0 points, the other team gets 3 points.
  - 3.10.2. A team may be disqualified completely from the competition.

#### **4. Game documents and rule hierarchy**

- 4.1. Every year, WRO publishes a new version of general rules for this category including the definitive description of the WRO Double Tennis Game. These rules are the basis for all international WRO events.
- 4.2. During a season, WRO may publish additional Question & Answers (Q&As) that can clarify, extend or re-define rules in game and general rule documents. Teams should read these Q&As before the competition.
- 4.3. The general rule document and Q&As may be different in a country due to local adaptations through the National Organizer. Teams need to inform themselves about the rules that apply in their country. For any international WRO event, only the information WRO has published is relevant. Teams that qualified for any international WRO event should inform themselves about possible differences to their local rules.
- 4.4. At the competition day, the following rule hierarchy applies:
  - 4.4.1. General rule document provides the basis for the rules in this category.
  - 4.4.2. Questions & Answers (Q&As) can override rules in game and general rule documents.
  - 4.4.3. The judge on the competition day has the final word in any decision.



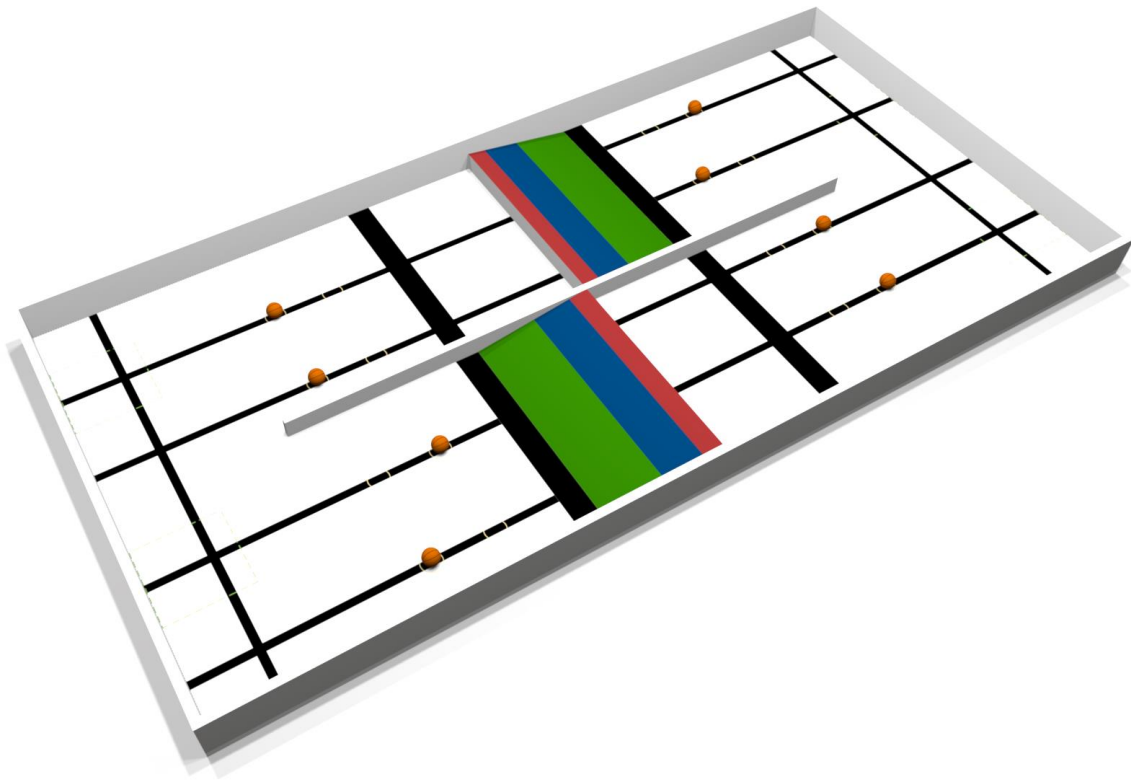
## 5. WRO Double Tennis – Game Description & Game Field

Each match of the challenge is for two teams of students. Each team of students prepares two robots. Both robots operate on the same half of the field and their goal is to collaborate on the common task - push all the balls from their half to another half.

Initially each half of the field contains 4 balls. During the match, balls will be pushed from one half to another. As well as pushing their own balls, a team's robots must constantly continue to identify new balls delivered from the other half by the robots of the opposing team. As soon as these balls from the opposition are found the robots must plan and perform actions to push these balls back.

A match takes 2 minutes and at the end of the match the winner is the team with the least amount of balls on their half of the game field.

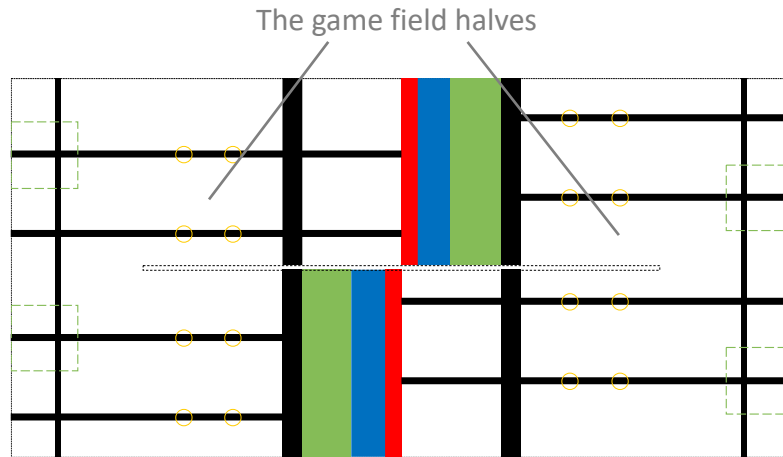
The following graphic shows the game field with the game objects.



**Figure 1. Detailed game field.**

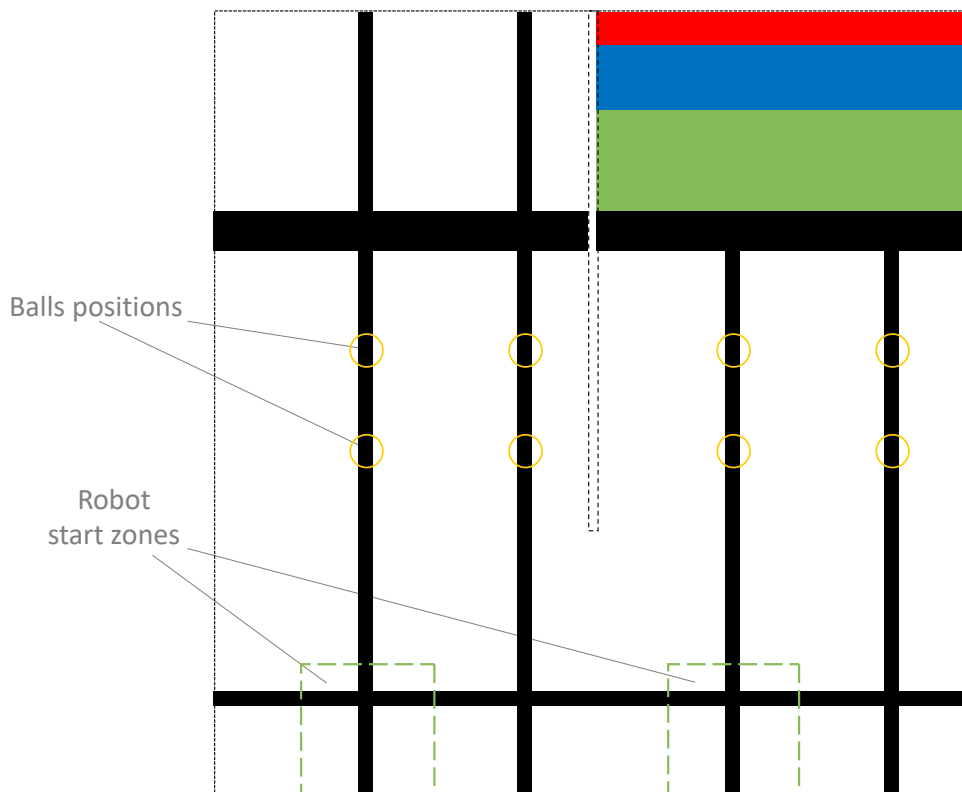


The game field consists of two halves. Each half contains one ramp. A barrier separates each half.



**Figure 2. Two halves on the game field.**

There are eight positions for the balls on every half: two randomizable positions of a ball on each black line. Two intersections of the black lines are used as starting positions of the robots.



**Figure 2. Start positions for the balls and robots**



## 6. WRO Double Tennis – Specific Game Rules

### WRO Double Tennis Tournament

6.1. The **tournament** consists of:

6.1.1. **Practice time:** During practice time, the contestants may practice in their team area, may queue with their robots to have one practice game on the game field, or may take measurements in the game field in so far as this does not interfere with other teams' practice. Teams are allowed to make changes to the program or to adjust the robots mechanically.

6.1.2. **Check Time:** During check time, the robots will be checked based on the requirements for robot materials, as mentioned in section 3 above. If a robot does not pass the check, the judges may provide a team up to 3 minutes to address issues found. Only one three minute period can be provided by judges for a team as part of the check after the first practice time slot. If, eventually, one of the team's robots does not pass the robot check by the judges, the team may not participate in the competition.

6.1.3. **Games:** A game consist of three matches of the same two teams in a row.

6.2. A typical competition day may look like this:

6.2.1. Opening Ceremony

6.2.2. 60 minutes practice time (first time slot)

6.2.3. Games, including a check time before each new game. During the game time, teams can modify the robots or practice on other tables (if available) when they are not competing.

6.3. Each team plays every other team once. For example, if there are 10 teams, 45 games will be played. Another tournament scheme (for example, the swiss-system tournament [https://en.wikipedia.org/wiki/Swiss-system\\_tournament](https://en.wikipedia.org/wiki/Swiss-system_tournament) or the double elimination tournament [https://en.wikipedia.org/wiki/Double-elimination\\_tournament](https://en.wikipedia.org/wiki/Double-elimination_tournament)) can be used for the International Final.

6.4. Teams should prepare and bring all the equipment, software and portable computers they need for the tournament.

6.5. Teams are not allowed to share portable computers and/or the program for the robots on the competition day.

6.6. On the day of the competition, there will be a minimum of 60 minutes of practice time before the start of the first match.

6.7. Teams cannot touch the designated competition areas before the start of the first practice time slot is announced.

6.8. Each team must work during practice time in their specified place until the check time, when the team's robots must be placed in a designated area (checking area). The controller on the robot must be powered off. No mechanisms or programs may be modified after this time.

6.9. Robots may take part in the game only after they have passed the check.

6.10. The team cannot exceed 90 seconds for preparation as soon as they are called by judges for participating in a particular game.

6.11. After the end of a particular game, the practice time for two teams continues. Should they wish, they may modify their robots and programs until the judges call for the next



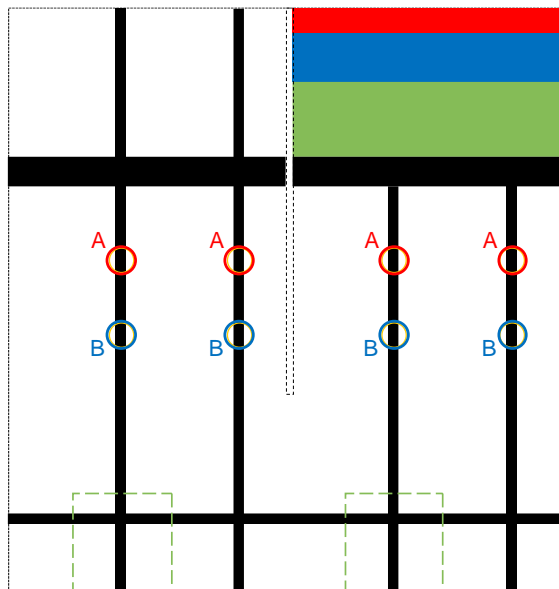


game. After this call the check time for such robots starts again.

**Starting Configuration:**

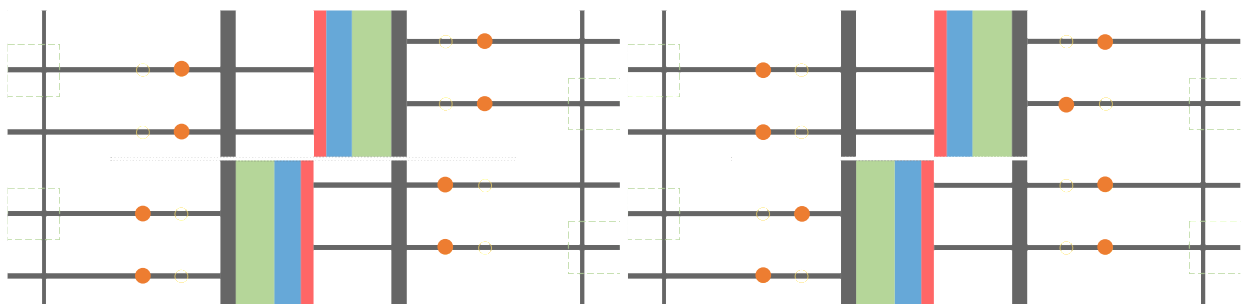
6.12. Before the match the locations of the balls on the field is determined. The following procedure can be used for this:

1. Toss a coin to determine the location of the first ball. Heads mean the ball location A (see the figure 3), tails mean the ball location B.
2. Repeat the coin toss three more times for the rest of balls on one half of the field.



**Figure 3. Possible balls' locations**

3. The arrangement of the balls identified on the step 1 and 2 is applied to another half of the field so one half of the field is a rotational symmetry of the other.



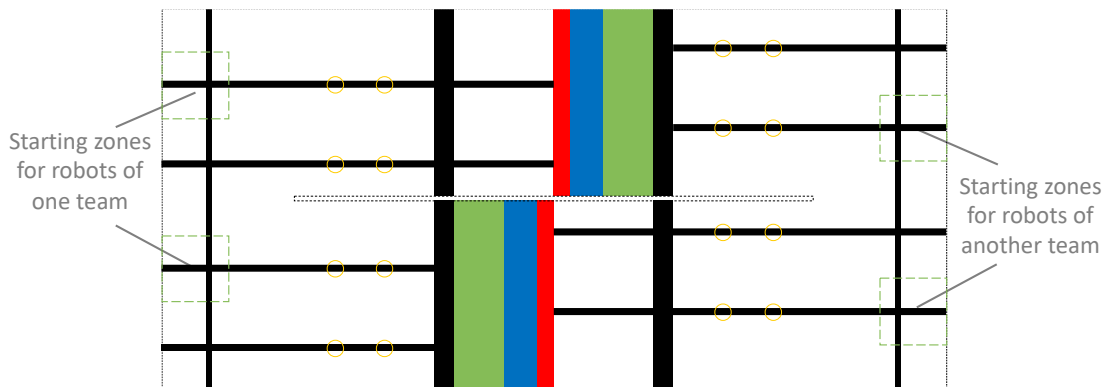
**Figure 4. Ball locations on one half are reflected locations of the ball location on another half**

- *For example, heads, heads, tails and tails were tossed for the left scheme on the figure 4 whereas tails, tails, heads and tails were tossed for the right scheme.*



### Matches – Start Configuration:

- 6.13. Every match is two minutes in length.
- 6.14. Each of two team's robots are located in the starting zones on one half of the field with every robot on the field being completely within the zones and no part of any robot is projecting beyond its zone. One starting zone must contain only one robot.



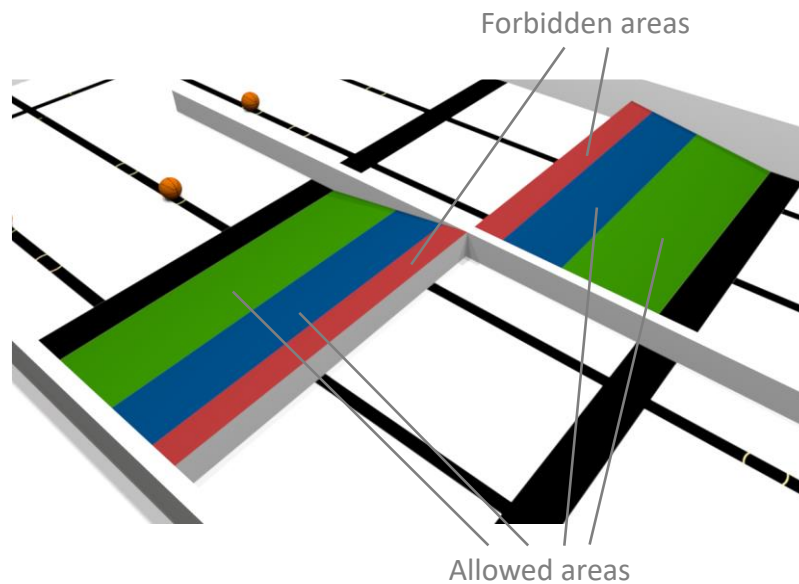
**Figure 6. Starting zones of the robots**

- 6.15. The robots must be totally SWITCHED OFF when they are placed in the starting zone!
- 6.16. The position of the robot in the starting zone must be so that the projection of the robot on the game mat is completely within the start zone.
- 6.17. Physical adjustments can be made (this is part of the preparation time); however, teams are not allowed to enter data to a program by changing positions or orientation of the robot's parts or to make any sensor calibrations on the robot. Teams may not enter data by changing the configuration of the switches, if any. If a team does enter data through physical adjustments, it will be disqualified for that game.
- 6.18. The robots are then switched on and the program is chosen.
- 6.19. The robots should then be in a waiting state. Waiting for a Start button to be pressed. A separately installed Push Button can be considered as the Start button. Only one Start button is allowed.
- 6.20. A judge gives the signal to start the robots. The starting buttons are pressed and the timing for the attempt begins simultaneously, after which the robots will commence their attempt to win the match.



### Matches – During the Match:

- 6.21. Robots must be autonomous and it participates in the matches entirely by itself.
- 6.22. The robot is allowed to leave any parts of the robot that are not containing main units (controller, motors, sensors) on the field, if needed. As soon as the part is touching the field or its game element and is no longer touching the robot it is considered a free element not part of the robot. **If the part prevents balls to be delivered from one half of the game field to another, the match is stopped and the team with the robot that left the part on the field loses the match. If the part left by one robot moved to the half dedicated for another team's robots, the match is stopped and the team with the robot that left the part on the field loses the match**
- 6.23. Participants are not allowed to interfere with or assist the robots. This includes entering data to a program by giving visual, audio or any other signals to the robots during the match. Teams that violate this rule loses the match. The result of this match will be 8:0 where 0 means zero balls for the losing team.
- 6.24. The robot is allowed to push, kick and throw balls.
- 6.25. The robot is allowed to drive on to the ramp on its field half.
- 6.26. The robot is not allowed to touch the ramp's red area on its field half. If any part of the robot touches the red area, the match is stopped and the team with the robot that violated the rule loses the match.

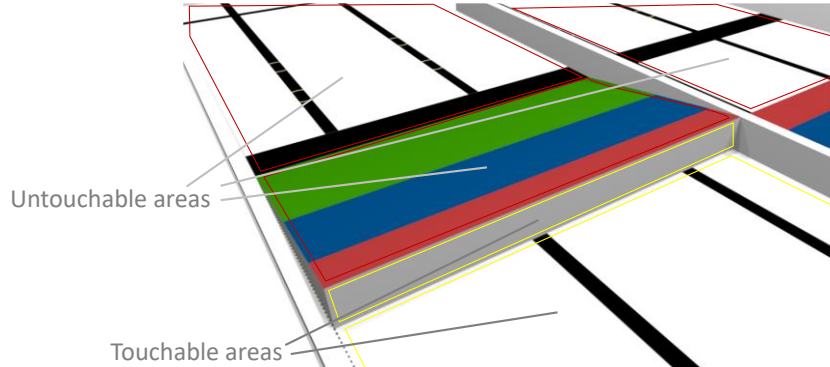


**Figure 6. A buffer zone (red area) on the ramp cannot be visited by the robots**

- 6.27. A team's robot is not allowed to touch the opponent's robot. If such a situation happens the match is stopped and number of the balls on each half of the field is calculated to get the score.



- 6.28. A team's robot is not allowed to touch the surface (mat and the ramp's slope) on the opponent's half of the field. If such situation happens the match is stopped and the team that violated the rule will lose the match. The robot is allowed to touch the face of the ramp which is perpendicular to the main plane of the game field.



**Figure 7. Areas that cannot be touched on the opponent's field half**

- 6.29. The situation when both robots of one team operate simultaneously with more than 4 balls at the same time is not allowed. The operation with the balls assumes pushing by a robot, holding by parts of a robot above the field surface or keeping balls surrounded by parts of one or two robots of the same team. If such a situation happens the match is stopped and number of the balls on each half of the field is calculated to get the score.
- 6.30. The robot is not allowed push, kick, throw or beat off balls off the field – they must remain within the game field. The robot must be designed so as to push, kick or throw balls gently. If the robot removes the ball from the field on its half (but not in the opponent's half of the field), the match is stopped and this ball (or balls) will be returned to the half it was removed from to calculate the score. If the robot pushes, kicks or throws a ball so that it moves out of the opponent's half of the field, this ball does not count in the score calculation, the match is not stopped. Balls moved from the game field are considered as out of the game, the rest is in-game balls.
- 6.30.1. A situation when a ball was pushed, kicked, thrown or beaten off by a robot and it then happens to bounce from the surface of another robot so that the ball is eventually outside of the field is not considered a violation.



**Matches – End of a match:**

- 6.31. The match ends and the time is stopped if any of the following conditions occurs:
  - 6.31.1. The match timer expires.
  - 6.31.2. The robot of one team touches the robot of another team or the surface (mat and the ramp's slope) on the opponent's half of the field.
  - 6.31.3. The robot removes the ball intentionally from the field on its half but not in the opponent's half of the field.
  - 6.31.4. The robot changes its size as so dimensions exceed 200x200 mm and 200 mm in height.
  - 6.31.5. After the first 30 seconds of the match there is a situation when all in-game balls are on the same half of the game field. The balls loaded to the robots on this half are counted as well.
  - 6.31.6. Any team member touches a robot, a ball, the field mat, the ramp, the barrier or the wall.
  - 6.31.7. The robot drives outside of the game field.
  - 6.31.8. The robot damages a ball.
  - 6.31.9. The robot or team member damages the field or a game element.
  - 6.31.10. There are no balls on the game field.
- 6.32. Team members must stop their robots when the judge signals that the match is stopped. The robots must stay on the field till the teams are given permission by the judge to take them off. Teams members must not move the balls either from one half of the field to another or outside of the field. If a team violates the rule, they will forfeit the match.
- 6.33. A ball (or balls) pushed, kicked or thrown by the robots after the judge's signal that the match is stopped must be returned to those halves of the field where the robots moved them from. If there is uncertainty as to whether a ball was moved before or after the signal, the judge is allowed to return it back to that half of the field where the robot responsible for the ambiguous movement of the ball is located.
- 6.34. The judges will base their decisions on the rules and fair game play. They have the final decision on the competition day. Please be aware that, as this is a team versus team competition, should a dispute happen the decision of a judge could result in one of the teams losing.



## 7. WRO Double Tennis – Scoring

- 7.1. The official score will be calculated at the end of each match by the judges. The winner in the group of two teams is identified after three matches.
- 7.2. The winner of a particular match is decided as follows:
  - 7.2.1. number of balls on the half of one team (T1) -- BT1
  - 7.2.2. number of balls on the half of the other team (T2) -- BT2
  - 7.2.3. if T1 has less balls on its half it wins ( $BT1 < BT2$ ), if T2 has less balls on its half it wins ( $BT1 > BT2$ ), if they have equal number of balls, they are tied ( $BT1 = BT2$ ).
- 7.3. The decision as to whether a ball is on one half or another is made based on the ball's position on the field. So, even if the ball is in contact with a robot the determinant is which side of the field it is on. If a ball is in contact with the robot and there is uncertainty as to which side of the field it is on then it will be decided according to which half of the field the robot is touching with, its wheels.
- 7.4. If the match is stopped due to the actions of a member of one of the teams (e.g., a team member touches a robot), the team which this participant belongs to loses the match. The result of this match will be 8:0 where 0 means zero balls for the losing team.
- 7.5. If a team wins two or more matches, the team will win the game and gets 3 points, the other team gets 0 points.
- 7.6. In all other situations, the game is considered a tie and both teams get 1 point.
- 7.7. The team must verify and sign the score sheet after the game, unless they have a fair complaint.
- 7.8. The teams' rankings for tournament are based on the sum of each team's points received in the games. If two teams have the same sum of points the following criteria are then considered (listed in the priority order):
  - 7.8.1. result of the game where the robots of these teams are played against each other: the winner of the game has a better ranking.
  - 7.8.2. number of violations: the team with fewer violations has a better ranking. The violation is one of the following actions:
    - a) any part of a robot touches the ramp's red area;
    - b) a robot touches an opponent's robot;
    - c) a robot touches the surface (mat and the ramp's slope) on the opponent's half of the field
    - d) a robot removes ball from its half of the field but not by moving it to the opponent's half of the field;
    - e) a team member touches a robot, a ball, the field mat, the ramp, the barrier or the wall;
    - f) a team member, coach or any person inside or outside of the competition area assists the robots during the match (the robots are not autonomous).
  - 7.8.3. The sum of the balls on the **opponent's** half of the field in each match: across all the matches each of the drawn team plays, the team whose opponents have, collectively, got the greater number of balls wins.
  - 7.8.4. If the ranks of two teams are still the same, judges can consider to have additional set of matches until one team has two wins more (in additional matches) than another team.



**Scoring Example:**

The following example shows the final ranking of 4 teams (A, B, C, D) playing against each other. Every team had 3 matches. You can see that team A and B got the same points (7), but team B scored more balls. Because of that, team B wins (rank 1).

	A	B	C	D	Points	Scored Balls	RANK
A		<b>1</b> 5:3/2:6/4:4	<b>3</b> 6:2/3:5/7:1	<b>3</b> 8:0/5:3/6:2	<b>7</b>	46	<b>2</b>
B	<b>1</b> 3:5/6:2/4:4		<b>3</b> 6:2/7:1/6:2	<b>3</b> 4:4/5:3/8:0	<b>7</b>	49	<b>1</b>
C	<b>0</b> 2:6/5:3/1:7	<b>0</b> 2:6/1:7/2:6		<b>0</b> 0:8/4:4/3:5	<b>0</b>	20	<b>4</b>
D	<b>0</b> 0:8/3:5/2:6	<b>0</b> 4:4/3:5/0:8	<b>3</b> 8:0/4:4/5:3		<b>3</b>	29	<b>3</b>



## 8. Robot material & regulations

- 8.1. Teams must build two robots. Each robot's dimensions must not exceed 200x200 mm and 200 mm in height during the match.
- 8.2. The controller, motors and sensors used to assemble robots must be from the LEGO® Robotics platforms: LEGO® Education MINDSTORMS® EV3; LEGO® Education SPIKE™ PRIME; LEGO® MINDSTORMS® EV3 or Robot Inventor
- 8.3. The allowed controller for the robot is LEGO® Education MINDSTORMS® EV3; LEGO® Education SPIKE™ PRIME; LEGO® MINDSTORMS® EV3 or the hub of LEGO® MINDSTORMS® Robot Inventor.
- 8.4. Teams can use Bluetooth or Wi-Fi for their robots' communication during the matches.
- 8.5. Any kind of wireless communication between robots and participant's portable computers is not allowed during the matches. The judges can inspect the code and the robots in order to confirm that it is not used by any means.
- 8.6. Teams can use any cameras of their choice. WRO recommends use of Pixy2 for LEGO® MINDSTORMS® EV3 and OpenMV for LEGO® SPIKE PRIME.
- 8.7. For the WRO International Final the only allowed battery for SPIKE/EV3 must be an official LEGO rechargeable battery (no. 45610 or no. 6299315 for SPIKE/Robot Inventor, no. 45501 for EV3,).
- 8.8. Additional optical elements like lens kits or mirrors can be used together with cameras.
- 8.9. The use of SD cards to store programs is allowed. SD cards must be inserted before check time and may not be removed until the next practice time starts.
- 8.10. Only LEGO branded elements may be used to construct the remaining parts of a robot. WRO recommends use of the Education versions of LEGO® MINDSTORMS®.
- 8.11. Teams can use 3D printed elements, elements prepared with a CNC machine, elements cut from acrylic/wood/metal to fix a camera, a lens kit or a mirror on to the robot.
- 8.12. It is not allowed to use screws, glues or tape or any other Non-LEGO material to fasten LEGO components on robots. The teams are not allowed to make any changes to the original LEGO parts (e.g. controller, engine, sensors etc.). The only exceptions are original LEGO ropes or tubes, that can be cut to size. Failure to comply with these rules will result in disqualification.
- 8.13. Teams should bring enough spare parts. In the case of any accidents or equipment malfunction, WRO (and/or organizing committee) is not responsible for their maintenance or replacement.
- 8.14. The teams can bring the robots assembled.
- 8.15. Contestants may prepare the program for the robots beforehand.
- 8.16. Control software can be written in any programming language – there are no requirements to use a specific language.
- 8.17. The team is allowed to have only two robots on the competition day. No spare robots are allowed.





## 9. Game table and equipment

### Game Table & Field

- 9.1. In this category, the robot solves missions on a field. Every field consists of a game table (an even ground with borders) and a printed mat that is put into the game table.
- 9.2. The dimensions of a WRO mat in any age group are 2362 mm x 1143 mm. All Game Tables are the same size, though a tolerance of +/- 5mm in length and width is given. The official height of the borders of a game table is 100mm, higher borders can be used as well. The borders are a bit higher than those of the RoboMission category tables, but in every other respect they are the same size. Due to the use of the balls, the higher borders are necessary for a better game play. The higher borders can be added (e.g. attached to) a RoboMission table. The thickness of the walls is not defined.
- 9.3. The inner color of the walls is white. The outer color of the walls is not defined.
- 9.4. The game mat must be printed with a matt finish/overlay (without reflecting colors!). The preferred printing material is a PVC tarp with around 510 g/m<sup>2</sup> (Frontlit). The material of the game mat should not be too soft (e.g. no mesh banner material).
- 9.5. The width of the thin black lines is 20 mm, the width of the thick black lines is 60 mm.
- 9.6. The diameter of the ball location areas is 50 mm. The color of the line is orange (RGB: 250, 204, 0).
- 9.7. The size of robot starting zones is 200 x 200 mm. The color of the dashed lines surrounding the zones is green (RGB: 133, 188, 87).
- 9.8. Two ramps 300 x 563 x 50 mm are fixed on the field. The material of the ramps is wood, laminated chipboard or styrofoam. The main color of the ramp slope is green (RGB: 133, 188, 87). The width of the blue (RGB: 0, 112, 192) area is 100 mm. The width of the red (255, 0, 0) area is 50 mm. The color of the rest of the ramp is white.
- 9.9. The barrier size is 1562 x 17 x 50 mm. It is rigidly fixed to the field.

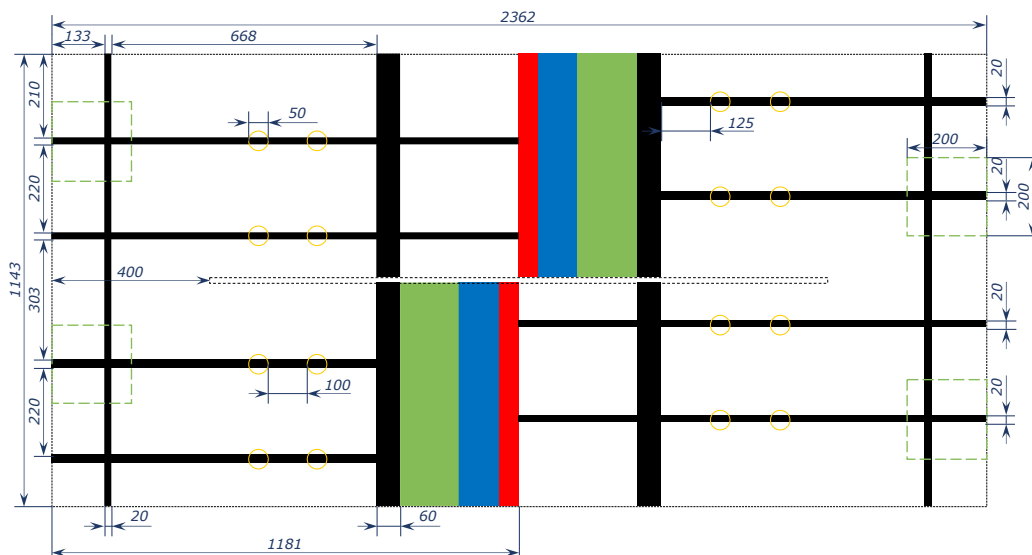


Figure 8. The game field map with sizes



## Balls

- 9.10. Every ball is a standard ping pong ball with a diameter of 40mm.
- 9.11. The color of the ball is orange.
- 9.12. 8 balls are required per game field.
- 9.13. The national and regional competition could use balls of another color but they must be different from the other elements of the field. The event organizers could consider changing the colors of the field mat in order to make the balls distinguishable. They need to inform the teams about the changes from the beginning.



## 10. Ideas for simplification

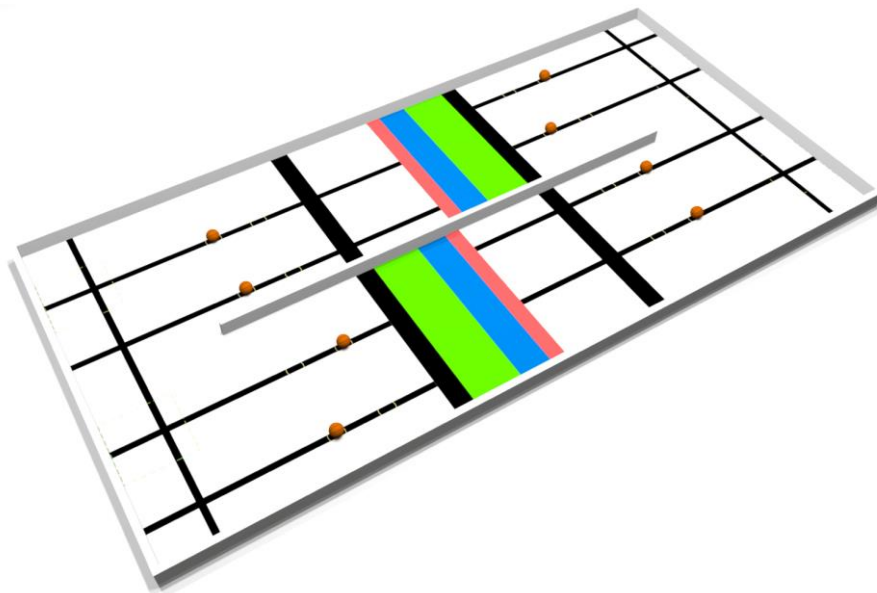
*Note: As mentioned at the beginning, these rules are made for all international WRO events. National Organizers can decide to change the rules for local needs. Here, are two ideas that could make the game easier.*

### Idea 1 – Larger Game Objects

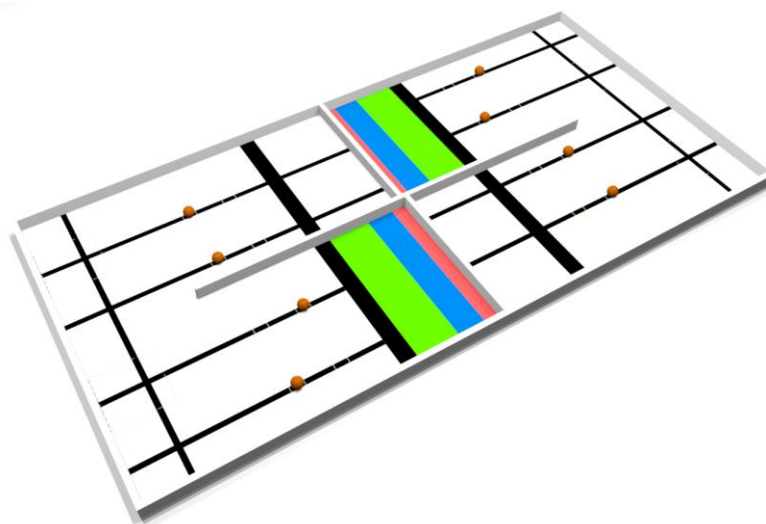
The competition with ping pong balls mostly focuses on the robots with cameras. Some national organizers could consider to adapt the challenge for the robots without cameras by using LEGO® plastic 52 mm balls (Element ID: 4156530) or tennis balls with the diameter 65-68 mm.

### Idea 2 – Simplified game field

There is the option of having the game field without the ramps:



**Figure 9. Field without the ramps**



**Figure 10. Field without the ramps but with barriers**



## 11. Glossary

<b>Check Time</b>	During the check time, the judge will take a look at the robot and check the measurements (e.g. with a cube or a folding rule) and other technical requirements. A check needs to be done before every game.
<b>Coach</b>	A person assisting a team in the process to learn different robotics aspects, teamwork, problem solving, time management, etc. The role of the coach is not to win the competition for the team, but to teach them and guide them through the problem identification and in discovering ways to solve the competition challenge.
<b>Competition organizer</b>	The competition organizer is the entity that hosts the competition a team is visiting. This can be a local school, the National Organizer of a country that runs the National Final or a WRO Host Country together with WRO Association running the International WRO Final.
<b>Game</b>	A game consists of three matches of the same two teams in row. A team wins a game if it wins two or more matches.
<b>Match</b>	Two teams play, with two robots each, a match that is scored. A team wins a match if less balls are on the own part of the field at the end of the match.
<b>Practice Time</b>	During the practice time, the team can test the robot on the field and the team can change mechanical aspects or the coding of the robot.
<b>Team</b>	In this document the word team includes the 2-3 participants (students) of a team, not the coach who should only support the team.
<b>WRO</b>	In this document, WRO stands for World Robot Olympiad Association Ltd., the non-profit organization running WRO world-wide and that prepares all the game and rule documents.