



# RoboMission

## Friendship Starter Game Rules Season 2023

*Unofficial WRO themed game for students 6 to 10 years old*



# CONNECTING THE WORLD FLOATING MARKETS

WRO International Premium Partner





# Table of Contents

- 1. Introduction ..... 3
- 2. Game Field ..... 3
- 3. Game Objects, Positioning, Randomization ..... 4
- 4. Robot Missions ..... 7
  - 4.1 Transport and Sort Fruit ..... 7
  - 4.2 Collect and Transport Specialties and Agricultural products ..... 7
  - 4.3 Get bonus points and avoid penalties ..... 7
  - 4.4 Park the robot ..... 7
- 5. Specific Game Rules & General Rules..... 8
- 6. Scoring..... 10
- 7. Local, regional, and international events ..... 12

**Information on how to use these game rules in countries:**

We deliberately have a mix of simple and more difficult tasks in the game rules. At a local, regional or national level however, there will be many teams that do not have the experience, knowledge or time to solve everything. This is intentional. By offering simple and more complicated tasks all teams will be able to solve parts of the challenge and can keep trying to improve their work. (Also see chapter 7)

**Please check chapter 5 for specific rules about allowed materials and the flow of the game and competition for this starter game!**

## 1. Introduction

Floating markets were formed because of the need of people living in river areas to trade goods. Thereby creating jobs and contributing to improving people's lives. A floating market is also a place to introduce a variety of specialties and agricultural products, as well as a transit point for goods to help connect urban areas with rural areas.

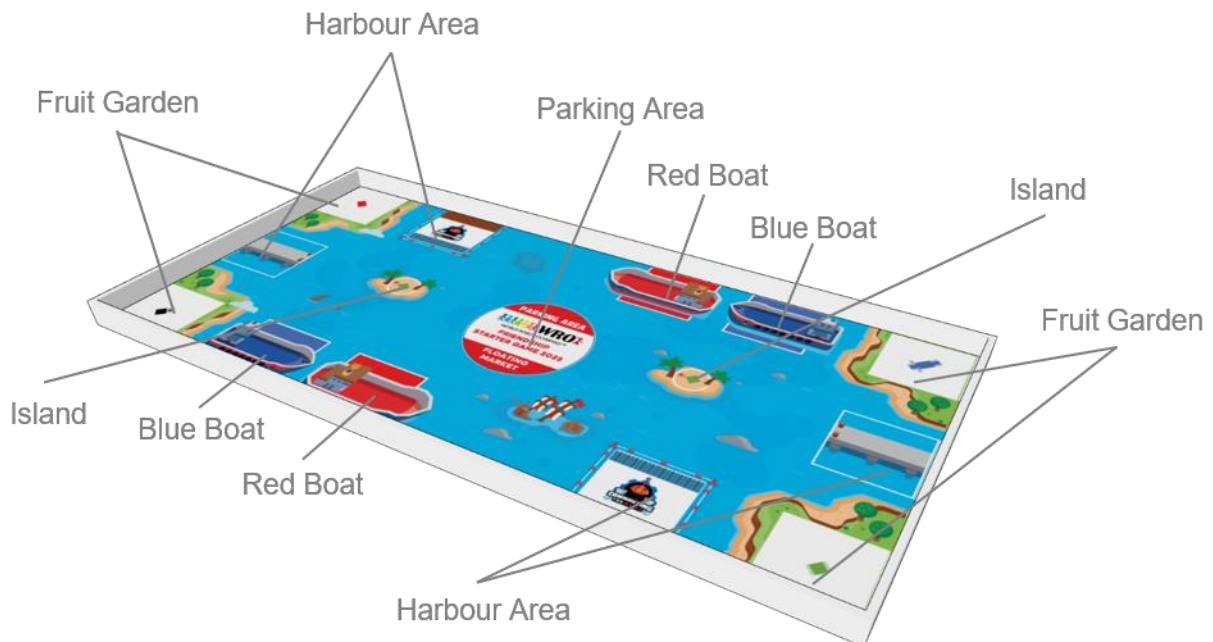


<https://vietnamnews.vn/life-style/299325/cai-rang-floating-market-named-cultural-site.html>

**This year, the challenge is to make a robot that can help to transport and sort fruit from the fruit gardens to the boats. The robot should also collect the specialties and agricultural products from the islands and transport them to the harbour.**

## 2. Game Field

The following graphic shows the game field with the different areas.



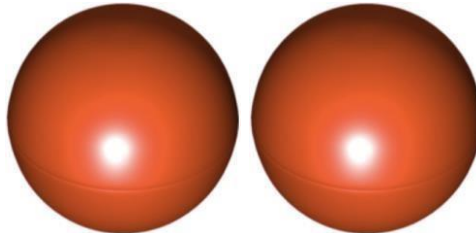
If the table is larger than the game mat, use the Fruit Garden in the lower right corner as a guide and then place the Fruit Garden at the edges of the corner walls to set up game mat.

**For more information about the table and game mat specifications, please take a look at PRO RoboMission Category General Rules.**

### 3. Game Objects, Positioning, Randomization

#### **Apple (2x)**

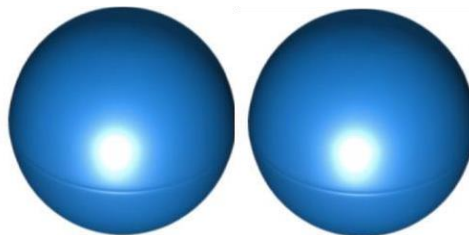
In every round there are two apple objects on the game field. The two apple objects are represented by the red LEGO balls. **In each round they are randomly** placed on top of a fruit-supporting device in two of the four Fruit Gardens.



Apple (2)

#### **Watermelon (2x)**

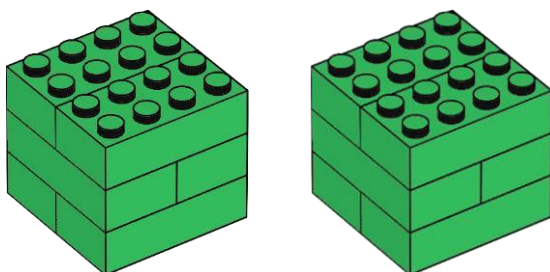
In every round there are two watermelon objects on the game field. The two watermelon objects are represented by the blue LEGO balls. In each round they are placed on top of a fruit-supporting device in the remaining two Fruit Gardens.



Watermelon (2)

#### **Specialties and Agricultural Products (2x)**

In every round there are two Specialties and Agricultural Products objects on the game field. The Specialties and Agricultural Products are represented by the green LEGO blocks. They are placed oriented as shown in the green figure inside the white circle of the Islands.



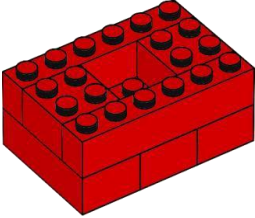
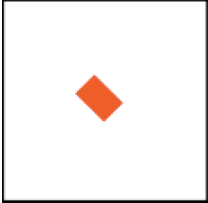
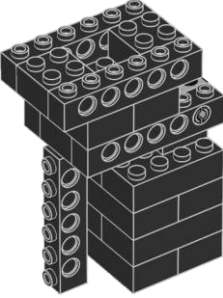
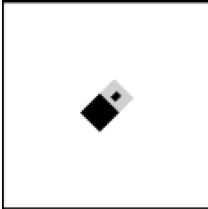
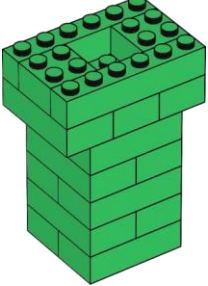
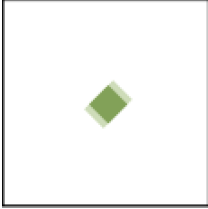
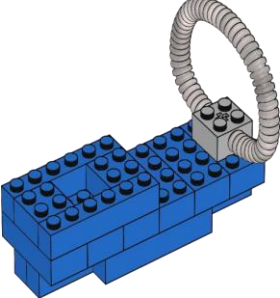
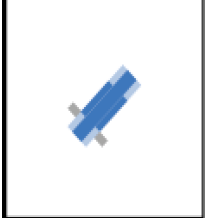
Specialties and Agricultural Products (2)



Start position of Specialties and Agricultural Products (Placed oriented as shown in the green figure inside the white circle of the Island.)

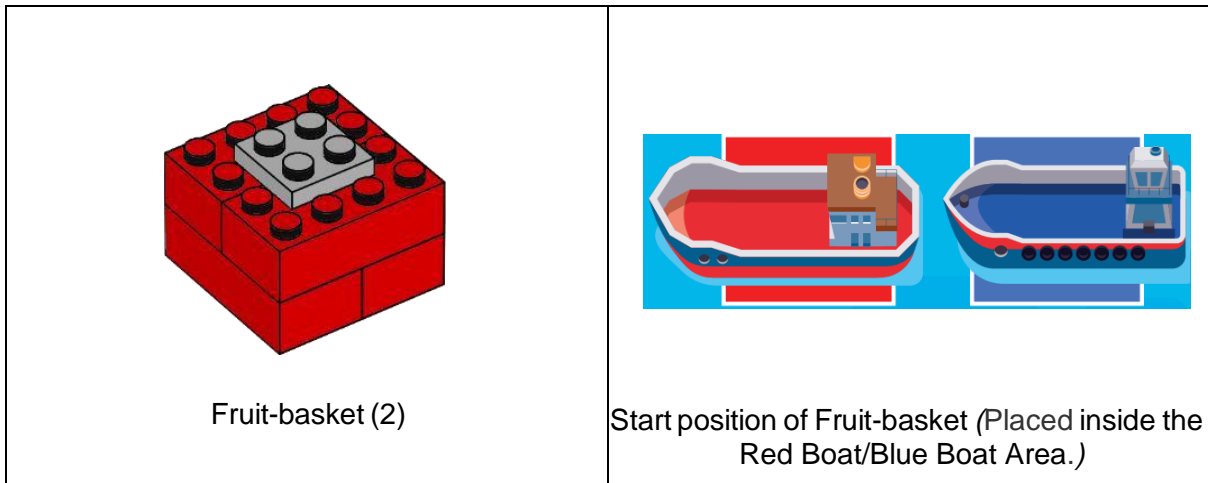
**Fruit-supporting device (4x)**

In every round there are four Fruit-supporting device objects on the game field (Red, Black, Green, Blue). The fruit-supporting devices are placed oriented as shown in the corresponding-coloured figure inside the white square of the Fruit Garden (Example: Red fruit-supporting device in the red figure, etc.):

 <p>Red Fruit-supporting device</p>	 <p>Start position of Red Fruit-supporting device (Placed oriented as shown in the red figure of the Fruit Garden.)</p>
 <p>Black Fruit-supporting device</p>	 <p>Start position of Black Fruit-supporting device (Placed oriented as shown in the black figure of the Fruit Garden.)</p>
 <p>Green Fruit-supporting device</p>	 <p>Start position of Green Fruit-supporting device (Placed oriented as shown in the green figure of the Fruit Garden.)</p>
 <p>Blue Fruit-supporting device</p>	 <p>Start position of Blue Fruit-supporting device (Placed oriented as shown in the blue figure of the Fruit Garden.)</p>

### Fruit-basket (4x)

In every round there are four Fruit-basket objects on the game field. The Fruit-basket are placed inside the Red Boat/Blue Boat Area (the red or blue square with white line):



### Summary randomization

On this field, the following objects are **randomly placed in each round**:

- Two apple objects on top of a fruit-supporting device in two of the four Fruit Gardens
- Two watermelon objects on top of a fruit-supporting device in the two remaining Fruit Gardens

One possible randomization you can see here: red X for the apple, blue X for the watermelon.





## 4. Robot Missions

For greater clarity, the missions will be explained in multiple sections. The team can decide which parts of the missions they will do and in which order. Final scoring will be based on the situation on the field at the end of the run.

### 1. Transport and Sort Fruit

The robot should help to transport and sort the fruit from the fruit gardens to the boat areas on the game field.

Full points are awarded if the apple/watermelon objects are in the corresponding-coloured Boat Areas (e.g. the red apple object in the Red Boat Area).

Only one apple/watermelon per boat counts. If the team brings two apple/watermelon objects to the corresponding-coloured Boat Areas, the one placed on top of a fruit basket will count.

### 2. Collect and Transport Specialties and Agricultural products

Floating market is also a place to introduce a variety of specialties and agricultural products. The robot should bring and collect the specialties and agricultural products from the islands and then transport them to the Harbour.

Full points are awarded if Specialties and Agricultural products are completely inside the Harbour Area. The Harbour Area is defined by the white line around the Red/Blue square. It is not allowed to damage the Specialties and Agricultural product objects.

### 3. Get bonus points and avoid penalties

Bonus points will be awarded for not moving or damaging the fruit-supporting devices.

A fruit-supporting device is moved if at least one part of the fruit-supporting device is no longer touching the white square (Fruit Garden Area) where it was placed at the beginning.

If a team illegally touches the robot or a game object a penalty of 1 point is subtracted from the score unless the score becomes negative.

### 4. Park the robot

The mission is complete when the robot returns to the Parking Area, stops, and the projection of the robot is **completely (top-view) within the Parking Area**. (Only gets these points if other points are assigned).



## 5. Specific Game Rules & General Rules

For the Friendship Starter Game, the normal PRO RoboMission General Rules apply, but there are some specific rules just for this age group. These specific rules are replacing similar articles in the General Rules and are mentioned here:

Specific rules about material

1. The controllers, motors and sensors used to assemble the robot must be from the LEGO Education WeDo 2.0 Core Set and/or LEGO Education SPIKE Essential. Any number and combination of controllers (Smarthubs), motors and sensors are allowed. Any LEGO branded non-electrical / non-digital elements can be used in the construction of the robot.
2. The maximum dimensions of the robot before it starts must be within 250mm×250mm×250mm. After the robot starts, the dimensions of the robot are not restricted.

Specific rules about the game

3. The robot must start from within one of the Harbour Areas, inside the white line.
4. During the attempt, the robot may be moved/operated under programmed control autonomously or under remote control or using a combination of the two methods. The robot can be controlled by any compatible device using WeDo 2.0/SPIKE Essential compatible software or with a remote controller build from WeDo 2.0/SPIKE Essential elements.
5. During an attempt, the team is allowed to touch/grab the robot when any part of the robot, e.g. a wheel, touches a Harbour Area.
6. During an attempt, the team is also allowed to move a robot from one Harbour Area to another Harbour. It is only allowed to move the robot, not the game objects.
7. The four pieces of fruit must be moved away from their fruit-supporting device by the robot. There is no restriction on the way a piece of fruit is removed from its fruit-supporting device.
8. When a piece of fruit is *either* completely within Red/Blue Boat area, a team member is allowed to pick up the fruit *manually* and place it in a fruit basket. It is only allowed to pick up and place the fruit in a fruit basket, not allowed to move it from one Boat Area to another Boat Area.
9. During an attempt, members of the team are:
  - *Not allowed to touch any game object outside of Harbour Areas.* If a team touches a game object outside a Harbour Area, the judge will place the touched item at the location on the field where it was located when the team touched the item and, in the state, it was when touched.
  - *Not allowed to touch the robot unless the robot is touching a Harbour Area.* If a team touches a robot which is not touching a Harbour Area, the judge will place the robot in the nearest Harbour Area.
  - If a team illegally touches the robot or a game object a penalty of 1 point is subtracted from the score unless the score becomes negative.





10. The mission is completed when either:

- The robot moves to the Parking Area, stops, the projection of the robot is completely within the Area (cables are allowed to be outside of the area) and the team communicates to the judge that the robot has finished.
- A team member shouts “STOP” and the robot does not move anymore.
- The 2-minute time limit has expired.

Specific rules about the competition

11. A National Organizer decides about the format of the Friendship Starter Game category and communicates this format to the participants. Please remember that a competition day for our youngest should make fun. It is also important that all teams have the same number of attempts to solve the challenge.
12. WRO advises National Organizers to add one or multiple Surprise Task to the competition. This boosts the creativity of the teams. A surprise task could be added to the official task. However, PRO encourages to (also) design a separate Surprise Task, that the teams can solve in an extra game round. This ensures that the team can show both the task that they practiced for and their ability to solve a challenge in a short time. The game objects and the game field will be the same as in the original game. For Surprise Tasks you can award up to 50 points.
13. Teams can bring the robot assembled to the competition. They do not need to re-build the robot on the competition day.

Here is an example for a competition day:

*Please note that it is the National Organizer that decides about the schedule in the country!*

- a) Opening Ceremony: 15min – 30min
- b) Test & Attempt time: 120min – 180min: During this time teams can test their robots and do their official runs (e.g. 3 runs per team).
- c) Lunch / Break: 30min – 60min
- d) Surprise Task Challenge(s): 80min – 120min: During this time teams can solve one or more Surprise Tasks to score additional points.



## 6. Scoring

### Definitions for the scoring

“**Completely**” means that the projection of the game object is inside the corresponding area.

Tasks	Each	Max.
<b>Transport and Sort Fruit</b>		
Apple/Watermelon Object completely removed from its supporting device by the robot.	10	40
Apple/Watermelon Object completely within a corresponding-coloured Boat Area (Red Boat/Blue Boat) and manually placed on the top of the fruit basket.	10	40
Apple/Watermelon Object completely within a corresponding-coloured Boat Area (Red Boat/Blue Boat).	5	20
<b>Collect and Transport Specialties and Agricultural products</b>		
The Specialties and Agricultural product completely removed outside of the Island.	5	10
The Specialties and Agricultural product is completely in the Harbour area.	10	20
The Specialties and Agricultural product is partly in the Harbour area.	3	6
<b>Get bonus points and avoid penalties</b>		
The fruit-supporting device is touching the white square (Fruit Garden Area) and not damaged.	3	12
If a team illegally touches the robot or a game object, a penalty of 1 point is subtracted from the score unless the score becomes negative.	-1	
<b>Park the robot</b>		
The projection of the robot is completely (top-view) within the Parking Area. (Only gets these points if other points are assigned).		10
<b>Maximum Score</b>		<b>132</b>



## Scoring Sheet

Team name: \_\_\_\_\_

Round: \_\_\_\_\_

Tasks	Each	Max.	#	Total
<b>Transport and Sort Fruit</b>				
Apple/Watermelon Object completely removed from its supporting device by the robot.	10	40		
Apple/Watermelon Object completely within a corresponding-coloured Boat Area (Red Boat/Blue Boat) and manually placed on the top of the fruit basket.	10	40		
Apple/Watermelon Object completely within a corresponding-coloured Boat Area (Red Boat/Blue Boat).	5	20		
<b>Collect and Transport Specialties and Agricultural products</b>				
The Specialties and Agricultural product completely removed outside of the Island.	5	10		
The Specialties and Agricultural product is completely in the Harbour area.	10	20		
The Specialties and Agricultural product is partly in the Harbour area.	3	6		
<b>Get bonus points and avoid penalties</b>				
The fruit-supporting device is touching the white square (Fruit Garden Area) and not damaged.	3	12		
If a team illegally touches the robot or a game object, a penalty of 1 point is subtracted from the score unless the score becomes negative.	-1			
<b>Park the robot</b>				
The projection of the robot is completely (top-view) within the Parking Area. (Only gets these points if other points are assigned).		10		
<b>Maximum Score</b>		132		
<b>Surprise Rule</b>				
<b>Total Score in this run</b>				
<b>Time in full seconds</b>				



## 7. Local, regional, and international events

WRO competitions take place in around 90 countries, and we know that teams in each country expect a different level of complexity. The challenge as described in this document will also be used for the international Friendship Invitational. This is the last stage of this unofficial starter competition, where the teams with the best solutions participate. That is why the game rules are challenging.

PRO feels that all participants need to be able to have a good experience in the competition. Teams with less experience should also be able to score points and succeed. This builds confidence in their ability to master technical skills, which is important for their future choices in education.

We deliberately have a mix of simple and more difficult tasks in the game rules. This means that all teams will be able to solve parts of the challenge and can keep trying to improve their work.

**WRO Association recommend that our National Organizers consider the situation in their country. They can adapt the rules for events in their country even further. They can decide to make the challenges easier for local, regional, and national events, so that all participants have a positive experience.**

**All National Organizers can make their own choices, so each competition fits their specific situation and ideas. Here we provide some ideas to make the challenges easier.**

### Ideas for simplifications:

- NO randomization (communicated before the competition day)
- Take out one or both Specialties and Agricultural products (in this case adjust the scoring for bonus points) (communicated before the competition day)